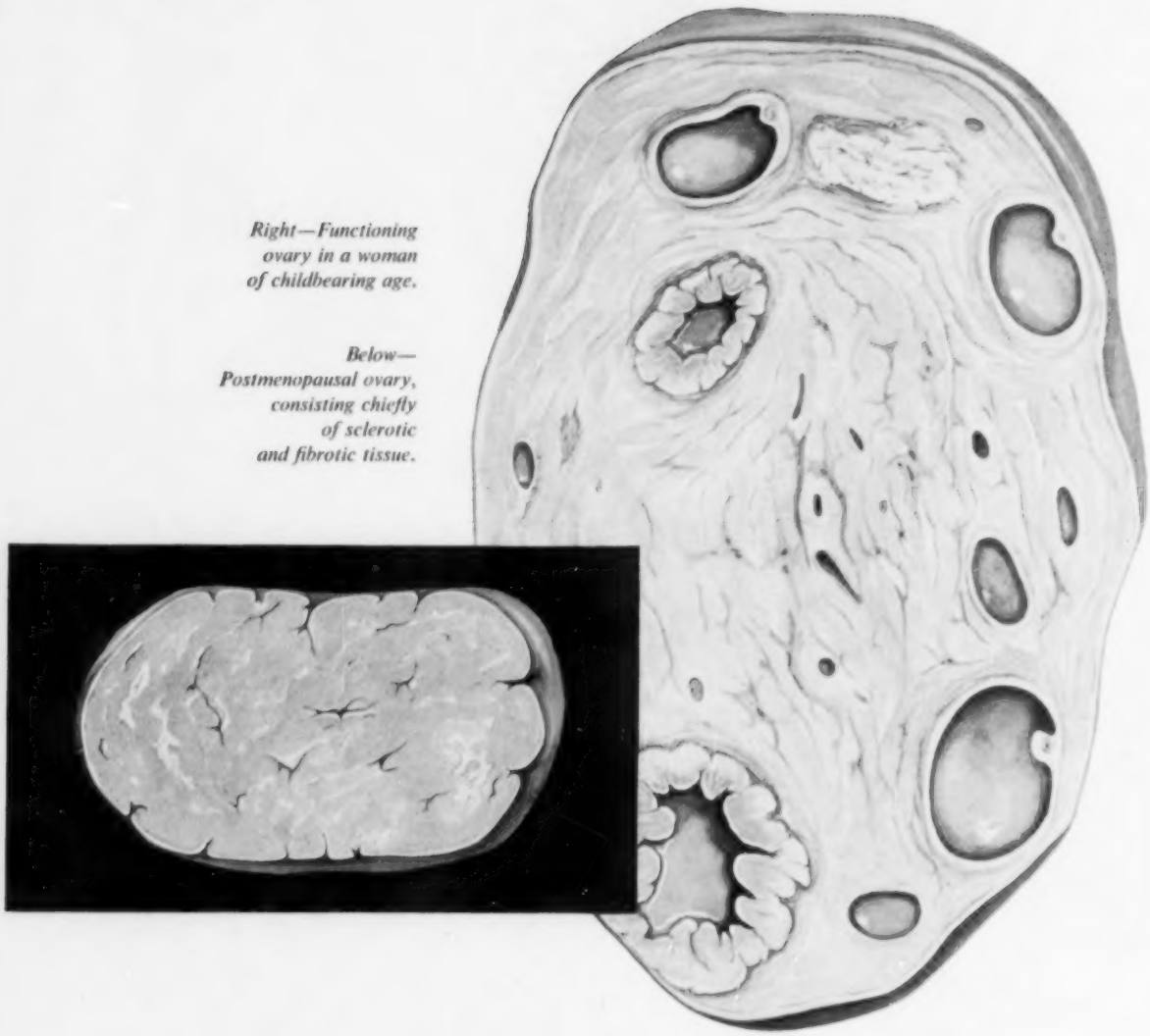
INDUSTRIAL MEDICINE AND SURGERY

Volume 23 JANUARY 1954 Number 1

Right—Functioning ovary in a woman of childbearing age.

Below—Postmenopausal ovary, consisting chiefly of sclerotic and fibrotic tissue.



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[1]Sturnick, M. I., and Gargill, S. L.: Clinical Assay of a New Synthetic Estrogen: Vallestril, New England J. Med. *247*:829 (Nov. 27) 1952.

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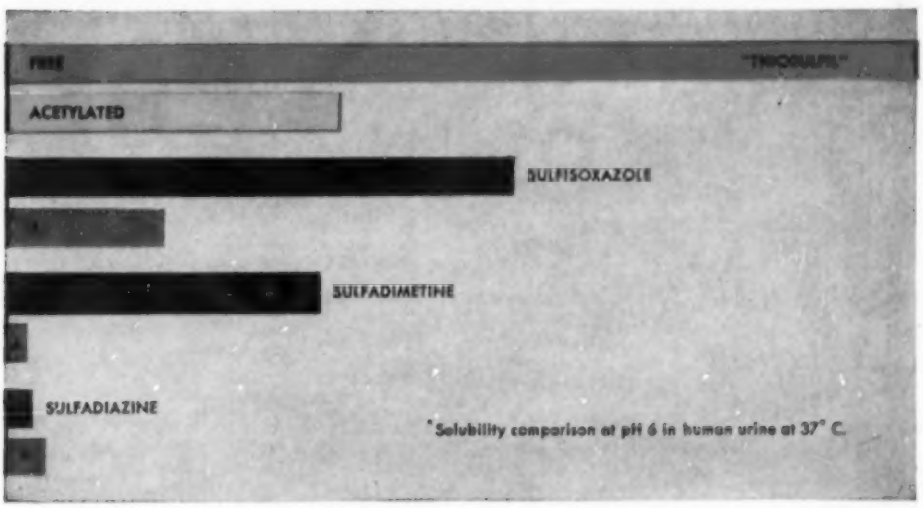

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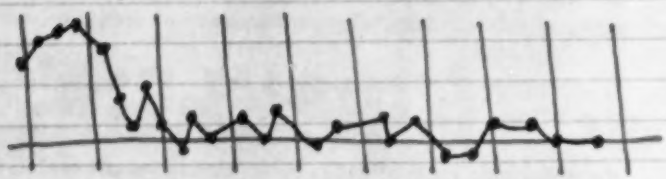

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1. Knight, V.: New York State J. Med. 50:2173 (Sept. 15) 1950.
2. Potterfield, T. G., and Starkweather, G. A.: J. Philadelphia Gen. Hosp. 2:6 (Jan.) 1951.
3. Swift, P. N.: Proc. Roy. Soc. Med. 44:1066 (Dec.) 1951.

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1. Tebrock, H. E.: M. Times 79:760, 1951.

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DR. GERRIT WILLEM HENDRIK SCHEPERS, of Johannesburg, South Africa, has been appointed Director of the Saranac Laboratory of the Trudeau-Saranac Institute, Trudeau, New York. He is expected to assume his new duties in the late spring. The Saranac Laboratory was established in 1894, as part of Trudeau Sanatorium, for research in pulmonary tuberculosis. In the past 30 years its activities have been broadened to include research on other chronic pulmonary diseases, particularly those of industrial origin. During 1953 the activities of the Saranac Laboratory, The Trudeau Foundation (a fund established to assist in carrying out the research program of the Trudeau organization) and the Trudeau Sanatorium(the parent corporate body) were merged under one administrative organization, Trudeau-Saranac Institute. DR. GORDON M. MEADE, formerly Medical Director of the Sanatorium, was appointed Executive Director. Under DR. SCHEPERS' guidance, it is expected that the work of the Saranac Laboratory, as it was conducted by previous directors, DR. EDWARD R. BALDWIN, DR. LEROY U. GARDNER, and DR. ARTHUR J. VORWALD, will be continued and expanded. DR. SCHEPERS was born in De Wets Dorp, Orange Free State, South Africa. He attended the Universities of Witwatersrand, Pretoria, and South Africa. In addition to holding other academic degrees, he is a Doctor of Science and a Doctor of Medicine. From 1934 to 1938 he was a part-time demonstrator at the Medical School, Johannesburg, and full-time lecturer there from 1939 to 1944. He was administrative and research medical

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officer, Johannesburg Municipal Benefit Society, 1941-1942, and Professor of Anatomy and Head of the Department of Physiology, and Foundation Member of the Medical Faculty of Pretoria, from 1942 to 1943. He was a Member of the Silicosis Medical Bureau, Union Department of Mines in Johannesburg from 1944 to 1948; and, in 1944 was a Member of the Miner's Phthisis Bureau. In 1949 and 1950 he traveled extensively in the United States, Canada, and Europe as a Commonwealth Fellow for the British Empire, studying industrial medicine. In 1952 he was named Chairman of the Pulmonary Disability Committee of the Miner's Phthisis Bureau, which position he now holds. This year DR. SCHEPERS was awarded the Queen's Coronation Medal in recognition of his service in the field of pulmonary disease disability. The full story of the enlarged Saranac program to be carried out under DR. SCHEPERS' direction will be made the basis of a report in this Journal within early months.

RUSSELL C. CARRELL, M.D., Medical Director, Lago Oil and Transport Company, Ltd., San Nicholas, Aruba, N.W.I., was recently honored by Queen Juliana of the Netherlands, who appointed him Officer in the Order of Orange Nassau in recognition of his work toward improvement of the health of the Aruban population.

RAPHAEL D. PATT, M.D., Johnson City, has been named an Assistant Medical Director of the American Heart Association. DR. PATT was engaged in the practice of medicine in Johnson City for several years, during which time he was associated with the medical department of the Endicott Johnson Corporation. He has also been affiliated with Fairview Park Hospital, Cleveland, New Jersey State Hospital, Marlboro, New Jersey, and Jennings Memorial Hospital, Detroit.

RODMAN WILSON, M.D., of Cincinnati, has accepted a temporary appointment as Director of Medical Service for the Gardner Board and Carton Company, of Middletown, Ohio. This is the first step in the establishment of a long-range industrial medical program. The company manufac-

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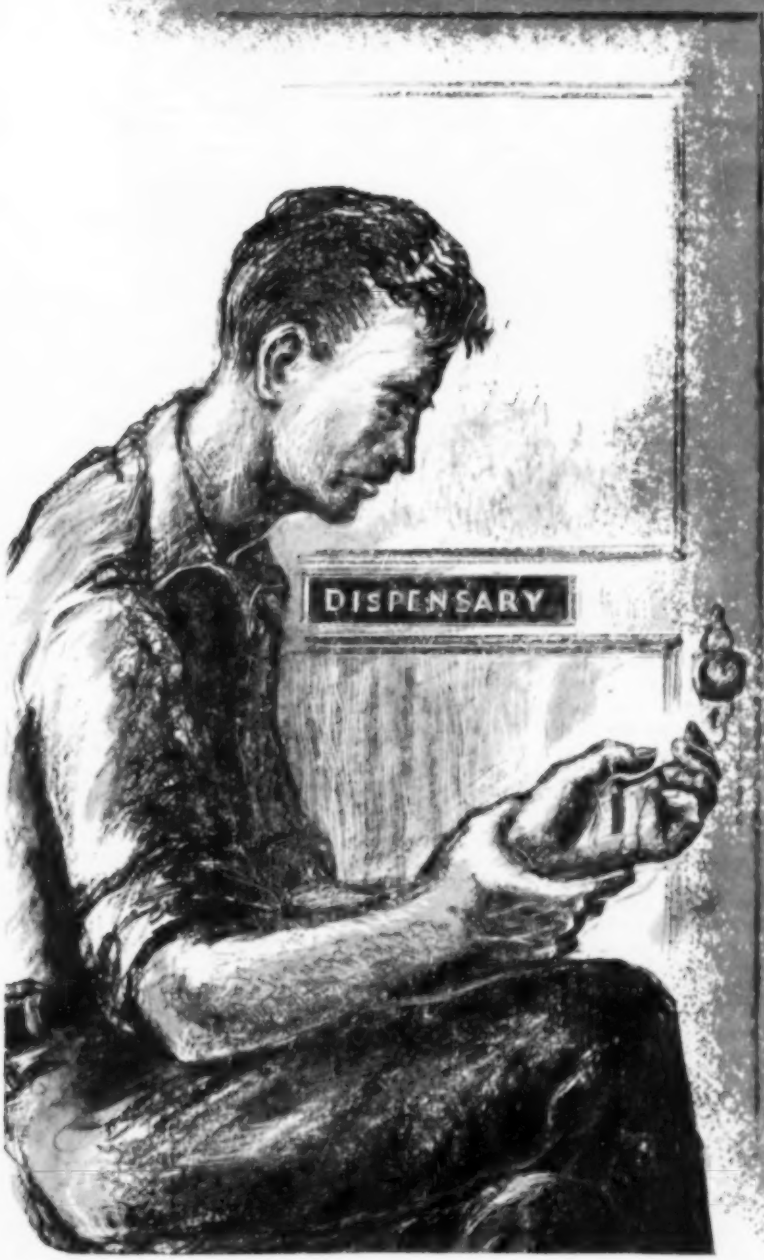

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tures paperboard, cartons, and retail boxes, and has plants in Middletown and Lockland (Cincinnati), Ohio. DR. WILSON will supervise the present company medical services and help set up the expanded program. Born in Nacogdoches, Texas, DR. WILSON is a graduate of Princeton University and received his M.D. from Johns Hopkins University. He interned at Bellevue Hospital in New York City. Before coming to Gardner Board and Carton Company, he was resident physician at Cincinnati General Hospital. He served two years in the Navy as a medical officer.

GEORGE H. GEHRMANN, M.D., Medical Director, E. I. du Pont de Nemours & Company, Wilmington, Delaware, has been given a citation by the Malvern (Pennsylvania) Institute for Alcoholism and Psychiatric Studies in recognition of "the exemplary leadership and courage he has displayed in furthering the treatment, understanding, and welfare of the alcoholic patient, and for many years of outstanding service in this cause."

ALBERT S. GRAY, M.D., who retired July 1 as Deputy Commissioner of the Connecticut State Department of Health, has been honored with life membership in the Connecticut Safety Society. The Award was presented during the Society's meeting on September 28 by Everett W. Martin, Past-President.

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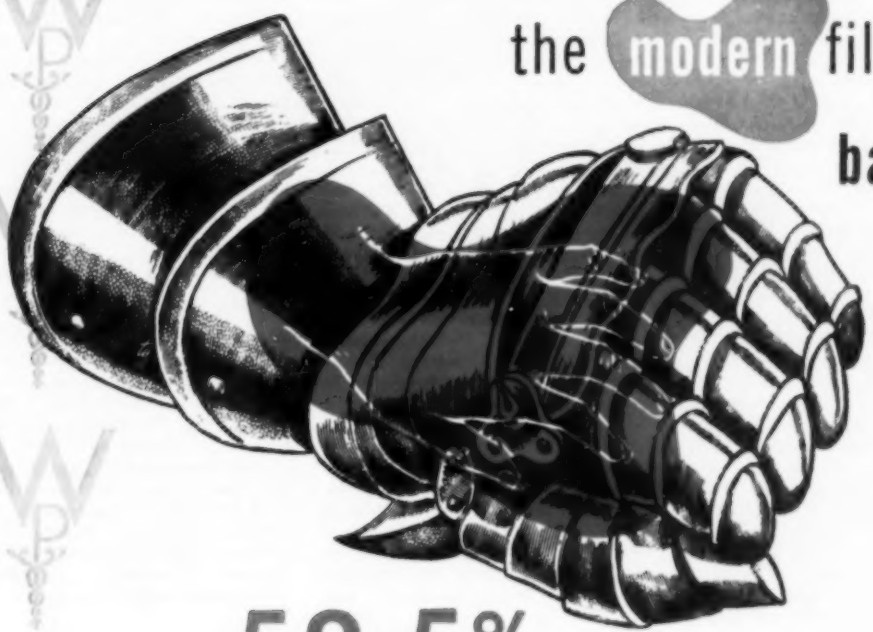

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were guests of Frankford Arsenal Tuesday, November 24. The purpose of the meeting was to observe the Industrial Medical Program as it is carried out at a major Defense Installation. The Industrial Medical Program at Frankford Arsenal is recognized as one of the foremost in the country. These Associations represent many diverse industries from a three-State area: Pennsylvania, Delaware, New Jersey. The guests were welcomed by COLONEL THOMAS J. KANE, Commanding Officer of the Arsenal. COLONEL IRVINE H. MARSHALL, Chief of the Preventive Medicine Office, 2nd Army, spoke on "Industrial Medicine During Mobilization." DR. L. P. DEVLIN, Director, Industrial Medicine, Frankford Arsenal, spoke on the relationship between industrial medicine and private practitioners.

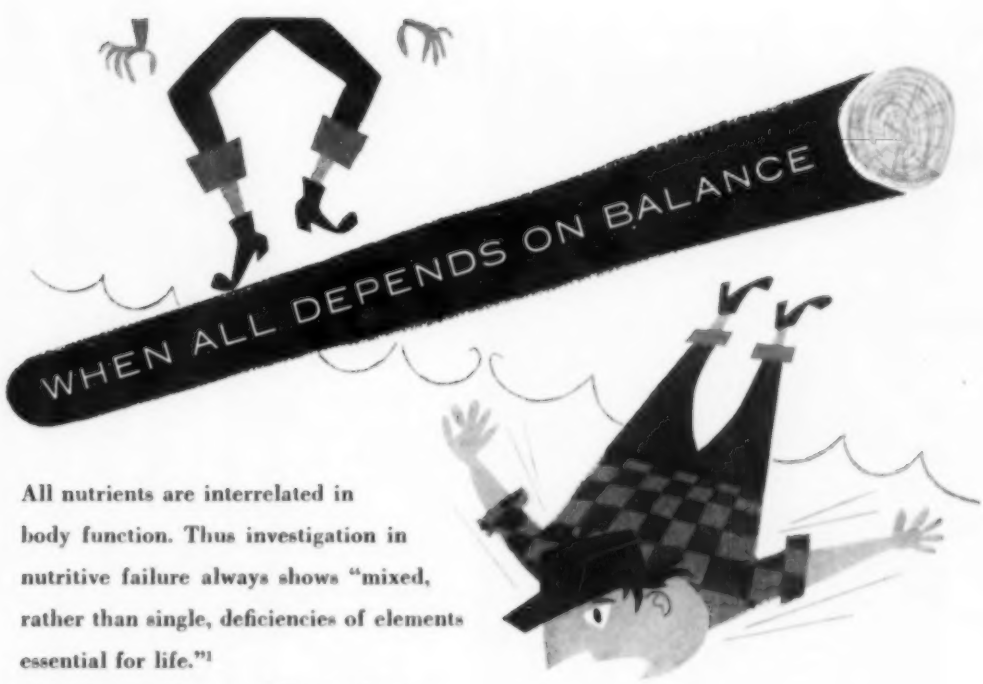
AT A DINNER meeting at the University Club of New York on December 16, 1953, members of the NEW YORK STATE SOCIETY OF INDUSTRIAL MEDICINE decided upon a program to revive the activities of the organization. This component society, one of the pioneers in the field of industrial medical organizations, has been largely inactive since World War II. Under the sponsorship of DR. R. C. PAGE, President-Elect of I.M.A., DR. D. R. GILLEN, President of the component society, arranged the Annual Dinner. Fifty members, from 16 industrial medical departments, including labor health groups, as well as individual practitioners of industrial and compensation medicine, were present. DR. GEORGE F. WILKINS, President of I.M.A. was the principal speaker. He reviewed the activities of the component societies and stressed that they were the bulwark of the parent organization. Following his address, various members made suggestions for increased activity of the society to encompass new members, an annual scientific meeting each fall, and perhaps a spring meeting in conjunction with the Section of Industrial Medicine and Surgery at the annual meeting of the State Medical Society. DR. D. R. GILLEN appointed a special committee to make recommendations for a program of interesting activity. Members of the committee include DR. HAROLD BRANDALEONE, DR. D. GOLDSTEIN, DR. F. P. GUIDOTTI, DR. J. J. POUTAS, and DR. T. G. RIGNEY.

Heart-In-Industry Conference

THE New York Heart Association, with 27 sponsoring agencies, including INDUSTRIAL MEDICAL ASSOCIATION, held a Heart-in-Industry Conference at Hotel Statler, New York, November 20, 1953. At the morning session, with DR. EDWIN P. MAYNARD, JR., Chief Attending Physician, Brooklyn Hospital, presiding, the speakers were DR. NORMAN PLUMMER, Chairman, Committee on Cardiovascular Diseases in Industry, New York Heart Association—"Introductory Remarks"; DR. S. C. FRANCO, Associate Medical Director, Consolidated Edison Company of New York—"The Cardiac Can Work"; DR. LOUIS KATZ, Director of Cardiovascular Department, Medical Research Institute, Michael Reese Hospital, Chicago—"What Stress Does to the Heart"; DR. LAURITZ S. YLVISAKER, Vice-President and Medical Director, Fidelity Mutual Life Insurance Company, Philadelphia—"Insurance Problems in the Employment of Cardiacs"; and DR. HOWARD B. SPRAGUE, Physician, Massachusetts General Hospital, Boston—"What Do We Mean by Welfare?" At the luncheon MAJOR GENERAL HOWARD MCC. SNYDER (Ret.), Personal Physician to President Eisenhower, and MR. WILLIAM WOOD PRINCE, President, Union Stockyard and Transit Company of Chicago, were the speakers. With DR. ANTHONY J. LANZA, Professor and Chairman, Department of Industrial Medicine, Post-Graduate Medical School, New York University, presiding, the afternoon session was a demonstration of a Work Classification Unit, followed by a panel on "Your Job and Your Heart." DR. LOUIS KATZ was Panel Moderator, and the panel members were: DR. CHARLES A. POINDEXTER, Professor of Medicine and Chief, Cardiovascular Section, Division of Medicine, Post-Graduate Medical School, New York University, *Cardiologist*; MR. A. AUGUSTUS LOW, Vice-President, Consolidated Edison Company of New York, *Management*; MR. NELSON H. CRUIKSHANK, Director, Social Insurance Activities, AFL, Washington, D.C., *Labor*; MR. JOHN H. LOTZ, President, Communications Workers of America, Local 1150, CIO, New York City, *Labor*; MISS MARY DONLON, Chairman, Workmen's Compensation Board, New York City, *Workmen's Compensation*; DR. ALBERT L. LARSON, Associate Medical Director, Travelers Insurance Company, Hartford, Connecticut, *Insurance*; DR. EDWARD M. KLINE, Medical Consultant, Lamp Division, General Electric Company, Cleveland, *Medical Director*.

This Month

THREE ITEMS on the recent "tobacco-lung cancer" developments, two of them medical and one non-medical, appear in this issue. The non-medical (page 34) says, "one obvious answer is to isolate and purify whatever it is in cigarette tar that causes cancer." This jumps to the conclusion that there *is* something in cigarette tar that causes cancer. DR. HUEPER, however, ends his article (page 13): "It may be concluded that the existing evidence neither proves nor strongly indicates that tobacco smoking, and especially cigarette smoking, represents a major or even predominating causal factor in the production of cancer in the respiratory tract . . . ." And DR. PAGE, in his editorial (page 42), emphasizes the positive approach, through medical research, to discovery of *whatever it may be*—not "whatever it is." Cancer-causing factors *can be* identified. The research on this very matter now under way at New York University has been noted in this Journal (*Indust. Med. & Surg.*, 22:10. 476 (October) 1953). There is a growing opinion that cancer-causing factors also should be sought elsewhere than in tobacco smoke—perhaps in other kinds of smoke, and in some of the concomitants of the economy of the last 50 years, such, for example, as food preservatives, adulterants, and coloring agents; the general pollution of the atmosphere in urban centers; and the tremendous increase in the volume of combustion products exhausted into the atmosphere from automotive sources. It is probable that the curves of the yearly increases in all of these things, if the figures could be obtained, would practically parallel the tobacco consumption curves in DR. HUEPER'S article (page 19). Much remains to be done, and it is far too early to do other than withhold any verdict until the evidence is all in, and has been critically examined, and makes probation conclusive.



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1. Spies, T. D., *Influence of Pregnancy, Lactation, Growth and Aging on Nutritional Processes, J.A.M.A., 153:185 (Sept. 19) 1953, p. 189*

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Janney, J. C.: Medical Gynecology. ed. 2, Philadelphia, W. B. Saunders Co., 1950, p. 365.

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Hindes, H. J.: Indust. Med. 15:262.

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1. Trafton, H. M., and Lind, H. E.: J. Urol. 69:315 (Feb.) 1953.
2. Blahey, P. R.: Canad. M. A. J. 66:151 (Feb.) 1952.
3. Knight, V.: New York State J. Med. 50:2172 (Sept. 15) 1950.

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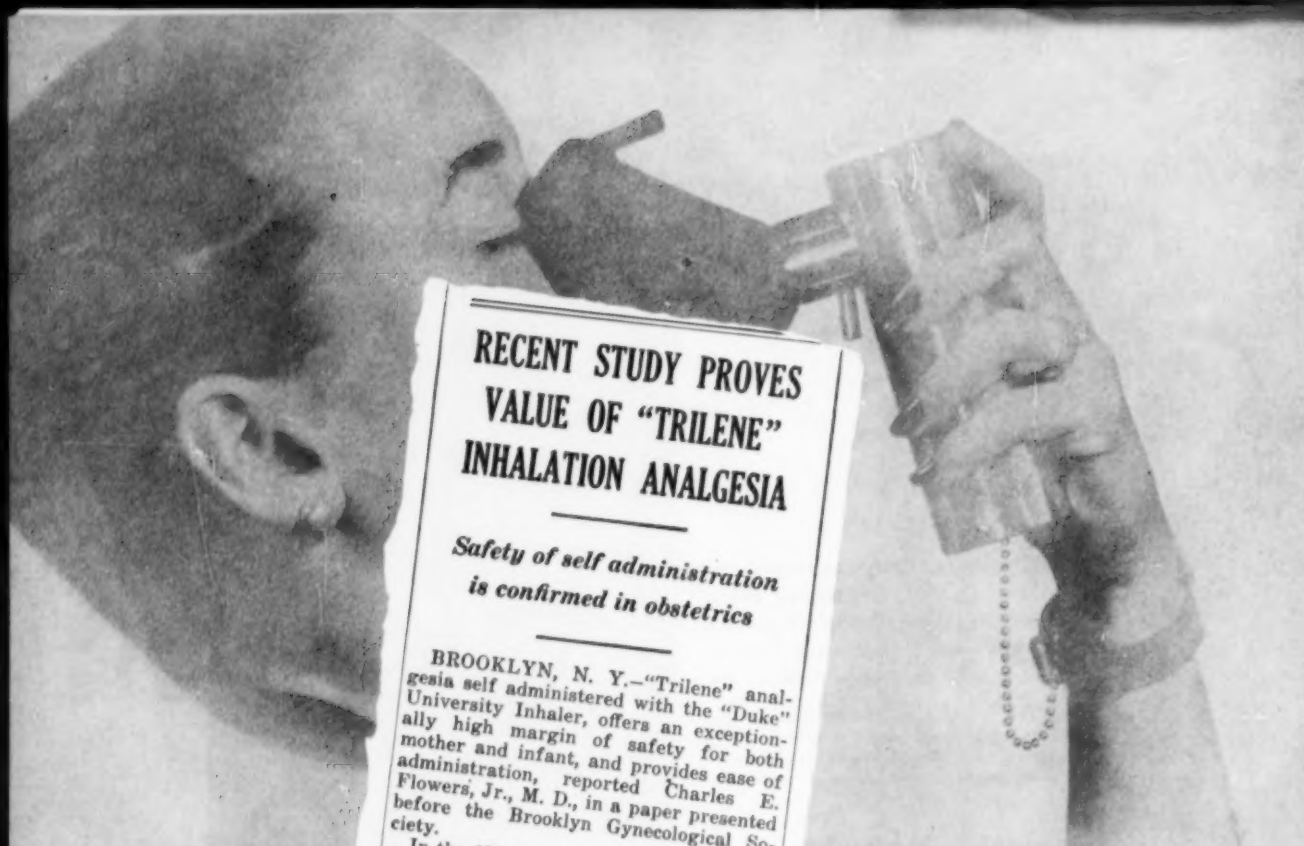

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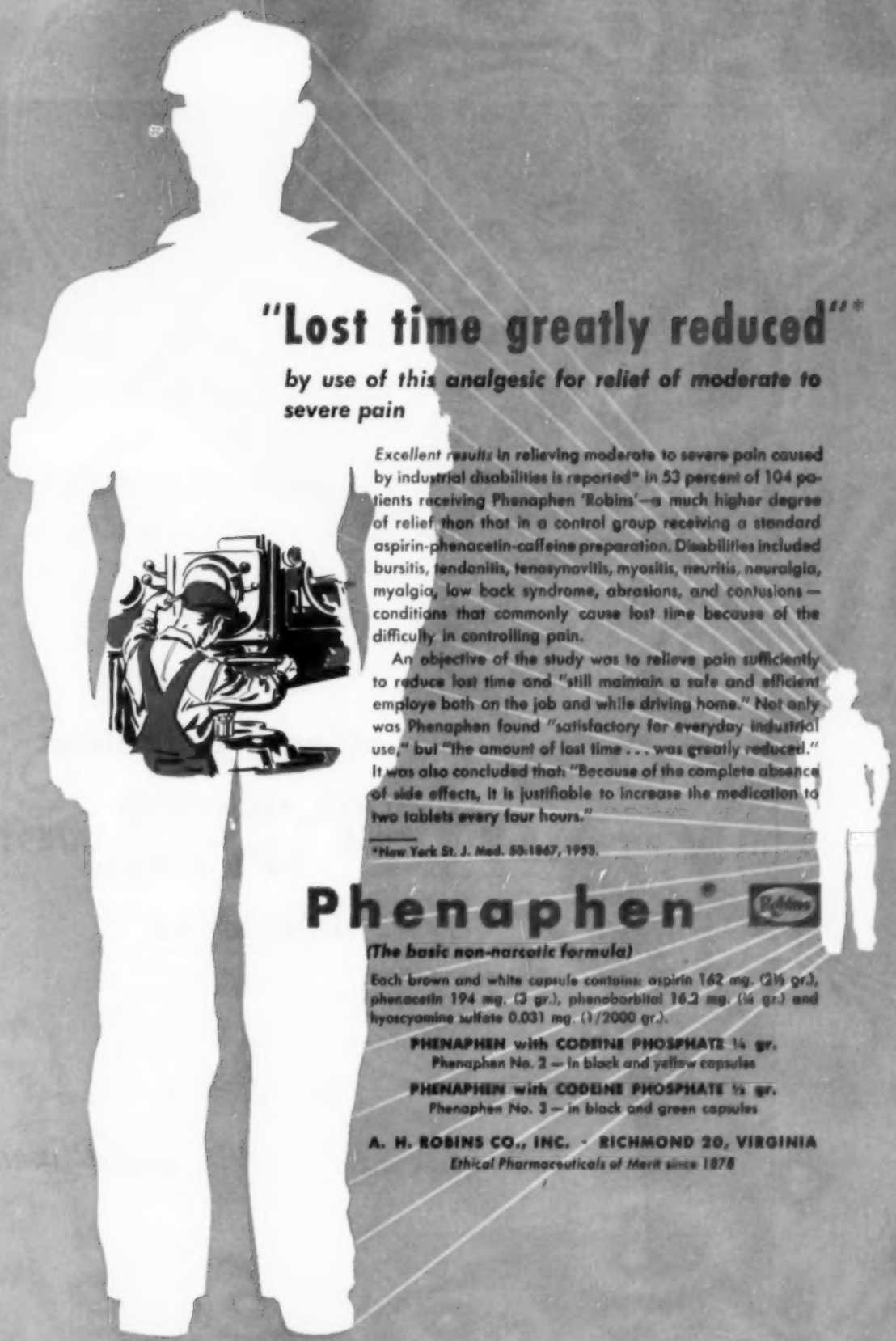

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*New York St. J. Med. 53:1867, 1953.

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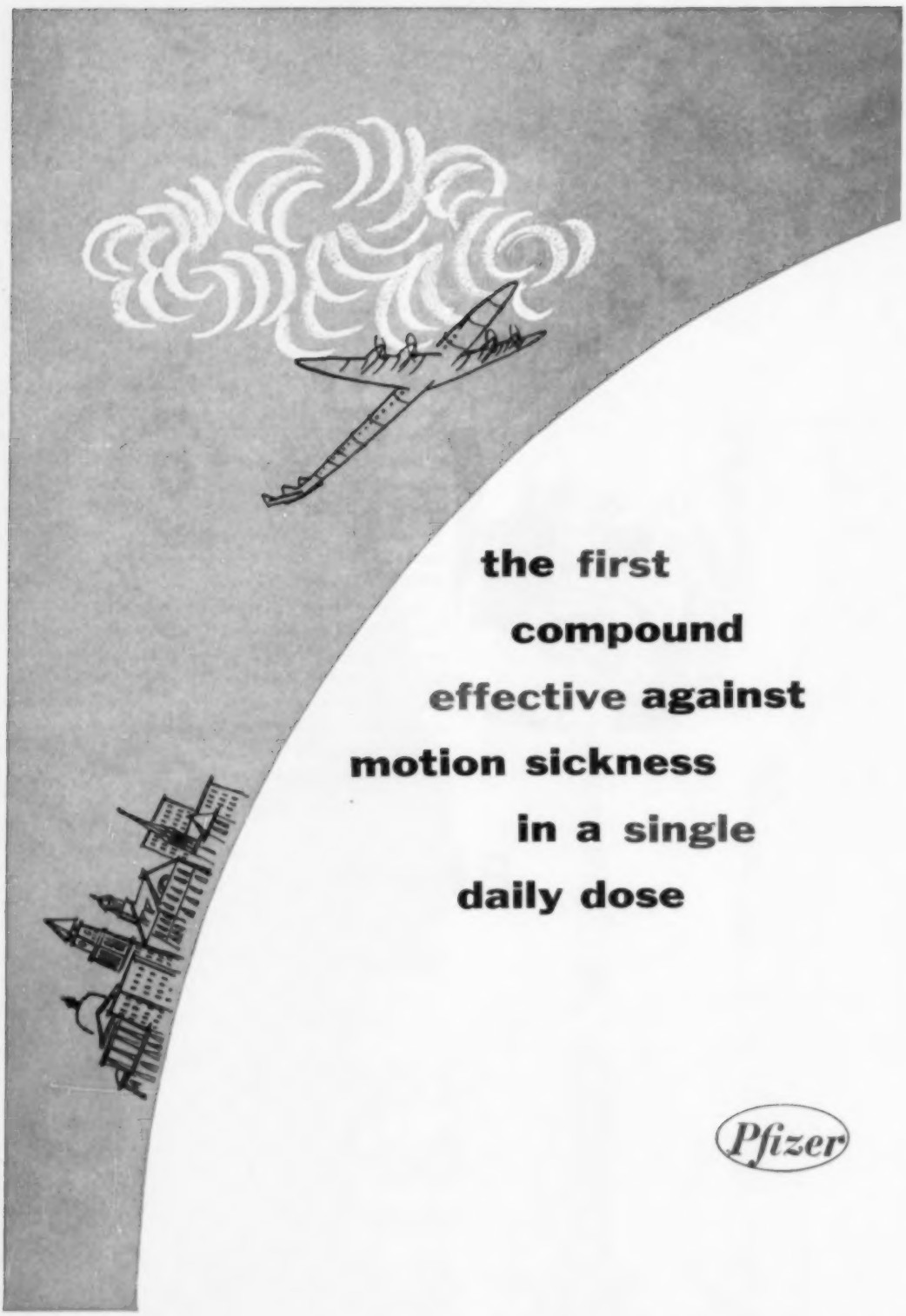
Ethical Pharmaceuticals of Merit since 1878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Bonamine is the only motion-sickness preventive which is effective in a *single daily dose.* Just two 25 mg. tablets (50 mg.) will provide adequate protection against all types of motion sickness — car or boat, train or plane — for *a full 24 hours in most persons.*

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Clinical studies have shown, in case after case, that relatively few of the patients experienced the usual side effects observed with other motion-sickness remedies: less drowsiness, dullness, headache, dryness of the mouth, etc. In addition, Bonamine is tasteless and acceptable to patients of all ages.

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The problem of cough control . . .

Cough control involves consideration of two factors, that of suppressing non-productive coughing which may cause irritation and become a secondary cause of intractable coughing, with its by-products of ". . . physical exhaustion, loss of sleep, aggravation of pleuritic pain, and stress incontinence,"[1] and, at the same time, of *not* suppressing cough which clears away excessive secretion. In Phenergan Expectorant with or without codeine you have a time-proved sedative-expectorant prescription, modernized with Phenergan to help achieve the above therapeutic aims.

1. Hillis, B.R.: Lancet 1:1230-35 (June 21) 1952.

FORMULA: Each teaspoonful (5 cc.) contains:

Codeine Phosphate (¼ gr.)	10.96 mg.	Chloroform	0.25 min.
Phenergan Hydrochloride	5.0 mg.	Citric Acid	66 mg.
Fluidextract Ipecac	0.17 min.	Sodium Citrate	197 mg.
Potassium Guaiacolsulfonate	44 mg.	in a pleasantly flavored syrup base. Alcohol 7%	

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Promethazine [N-(2'-dimethylamino-2'-methyl) ethyl phenothiazine] Expectorant with Codeine

the sedative-expectorant prescription modernized. **1 pint bottles.**

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Formula identical with the above except for omission of codeine. 1 pint bottles.

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balanced weave
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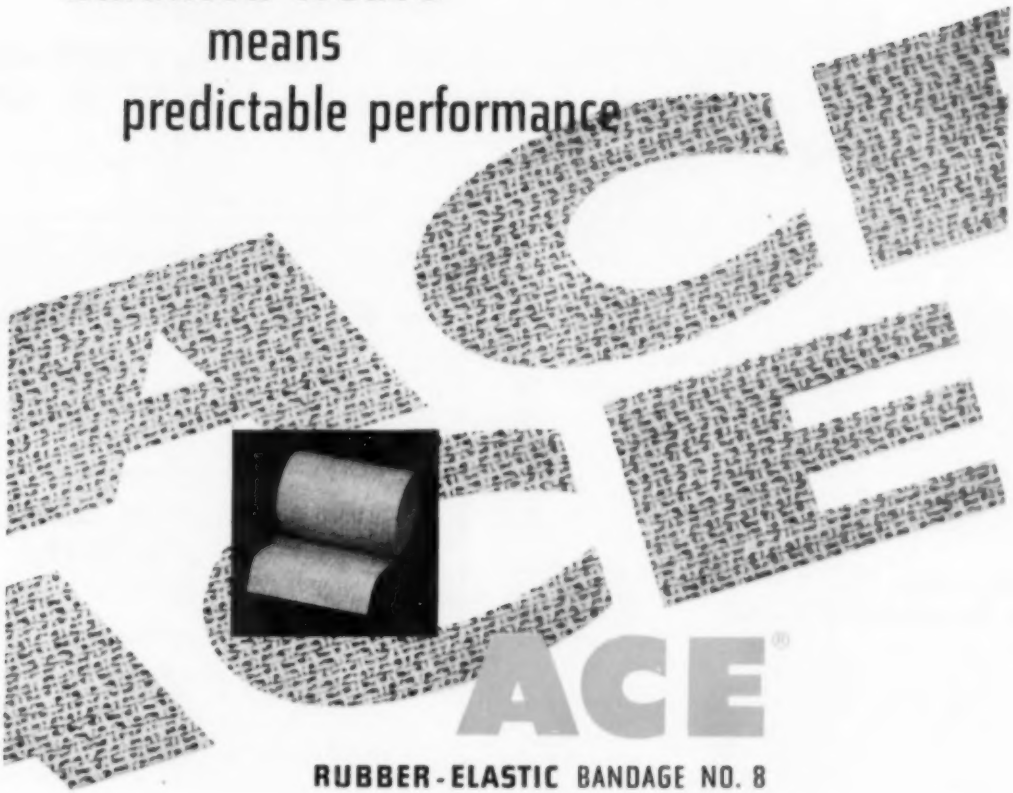

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balanced weave provides optimal support with uniform tension throughout the afflicted area

built-in elasticity minimizes slipping or loosening of the bandage

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'Industrial Back' Problem Solved!

THE STORM LAME BACK SUPPORT—How it is built—why it is built that way—WHAT IT DOES

We set forth herewith our concept of the Lame Back problem, particularly as related to low back pain and our efforts to assist the physician in his treatments. Our understanding of this problem is based, first, upon the theories of our founder, Katherine L. Storm, M.D., second, on the tremendous amount of help and suggestions from our physician friends, and third, upon the more than fifty years of cumulative effort and experience.

Our belt building is based on the following simple hypotheses:

1. Backache is a symptom
2. The symptom of a Lame Back is pain
3. Pain is due to muscle spasm

No matter which of the many causes is responsible for the low back pain, the fact remains that this area is subject to extreme leverage and weight bearing.

Acute Lame Back Prevented from Becoming Chronic

In acute lame back, caused by trauma, the Storm Lame Back Support furnishes traction towards the spine which limits the overstretched muscles and ligaments to their normal range. At the same time it allows for freedom of exercise of the abdominal lumbar muscles to milk out the effusion and hemorrhage so often associated with muscle strain. This is designed to discourage the formation of scar tissue or deposits which might cause chronic backache.

The Storm Lame Back Support substitutes for the overstretched and torn ligaments so that the normal weight bearing and motional functions of the muscles can be carried on. Following the lines of the musculature, the Storm Belt limits the strained muscles to their normal range so that exercise will not further overstretch them or the ligaments in their weakened condition.

Chronic Lame Back Gets a Big Assist

No matter which of the many causes of chronic lame back, there is tenseness and muscle spasm, resulting in pain. All Storm Lame Back Supports have a non-stretch band encircling the pelvic girdle with traction towards the spine. Under this band is the soft protecting body part and the band itself forms the foundation for the supporting back column. This band extends downward in front to protect the Hesselback Triangle, and it is arched to allow comfort in sitting position. The band is anchored at the back to keep it where it belongs. Under the band and extending upward are the firm traction-giving, canvas-interlined back pieces. These back pieces can be bent to accommodate lordosis. A pad is sometimes used for spondylo listhesis.

The body part of the belt is made of Storm Mesh, our exclusive material, knitted on our own knitting machine. This material has a 10% stretch with an 8 pound pull, without the use of deteriorateable rubber elastic. It gives a soft foundation to prevent pinching, and supports the upper abdomen to lift anterior weight without constriction.

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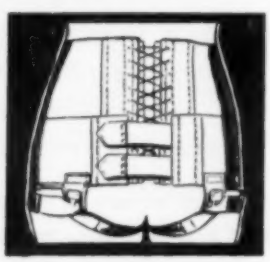
Prevents Loss of Man Hours

Bad News for Lawyers

"Your belt is the best we have found that can be bought at a reasonable price and fitted to most patients." Immediate application enables patients to go back to work without bed rest in most cases.



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Please rush _____ Model SA Supports.

Sizes _____ (waist measures).

Charge to us on open account. It is understood that these can be returned for credit if we so desire.

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Breck Hand Cleaner is an efficient, heavy-duty cleaner which is non-irritating and contains no abrasive materials. Breck Hand Cleaner cleans without lathering, and because of its mild yet thorough cleaning action aids in the prevention of skin irritation. About a teaspoonful of Breck Hand Cleaner is applied, without water, to the hands and arms and rubbed in well, followed by thorough rinsing. The excellent penetrating action of Breck Hand Cleaner loosens dirt, grime, and other soils and permits their easy removal in the rinse. Breck Hand Cleaner is formulated to rinse equally well in both hard and soft water. Breck Hand Cleaner has been found especially useful in helping to remove oil, grease, dirt, dust, grime, paint and other soils from the skin.

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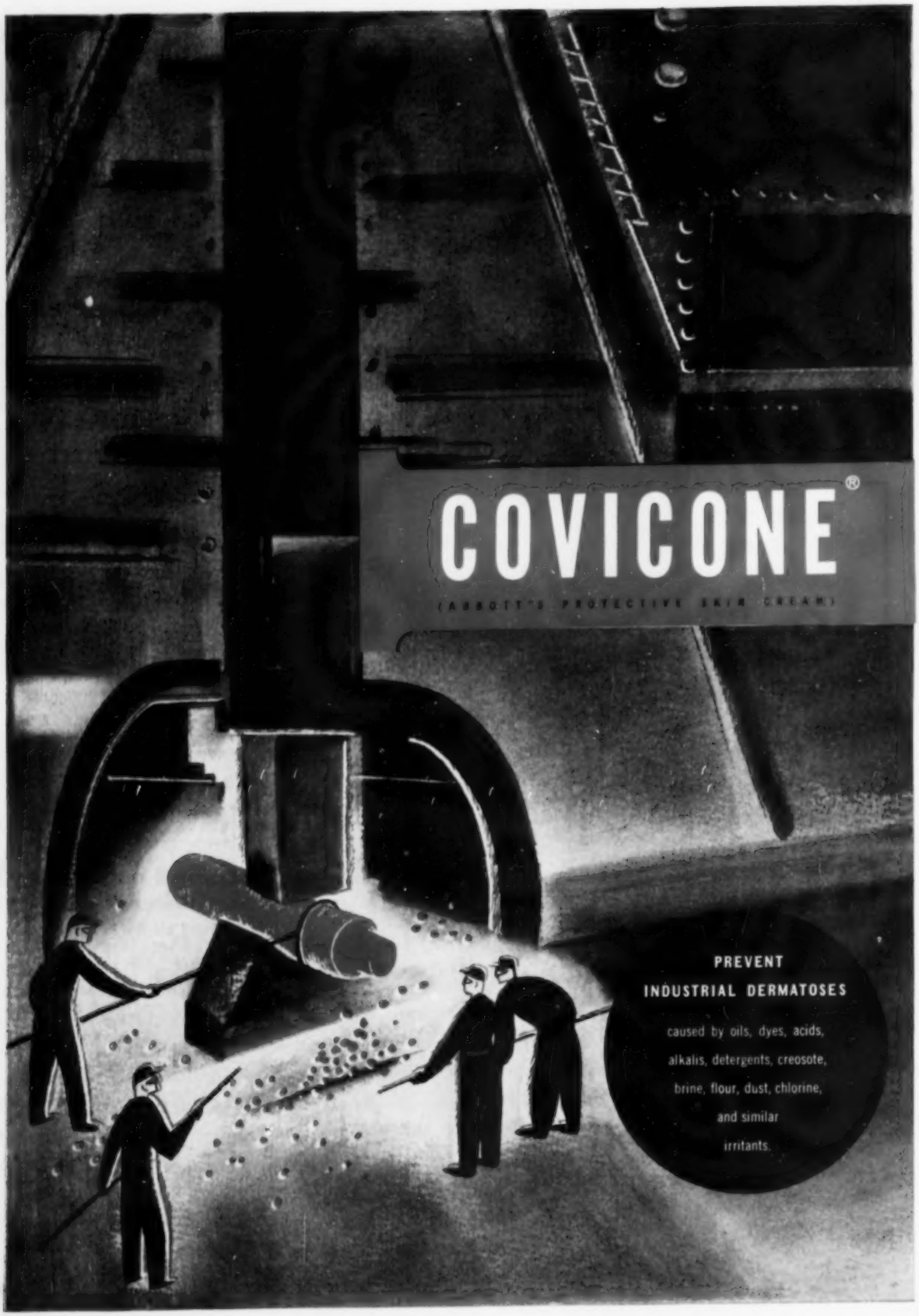
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PREVENT
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caused by oils, dyes, acids,
alkalis, detergents, creosote,
brine, flour, dust, chlorine,
and similar
irritants.

PREVENT HOUSEHOLD CONTACT ALLERGIES
from sensitization to soap, water, dye in clothing, cosmetics, metal of jewelry, watch straps, etc.

PREVENT IRRITATIONS FROM BODY FLUIDS
such as occur in diaper rash, persistent diarrhea, decubitus and varicose ulcers and allied conditions.

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contact dermatitis

in wide variety

of applications

protects skin longer...

PREVENT POST-SURGICAL INFLAMMATIONS
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PREVENT FURTHER IRRITATION OF LESIONS
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Now, using *one* cream, you can guard the skin against major sources of contact dermatitis. This new protective—COVICONE—forms an invisible, non-occlusive film against irritating external agents. Neither greasy nor sticky, it joins silicone with nitrocellulose and castor oil to give prolonged protection. It is not readily removed by soap and water.

One application lasts a day or more

Apply COVICONE 3 times daily for first 10 days; then just once every day. Wet lesions are the only contraindication; wait until the acute stages subside.

If you'd like to see clinical reports on COVICONE's efficiency, just drop us a note.

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A "SPRAY-ON" SURGICAL DRESSING

FOR WOUNDS,

BURNS, AND ABRASIONS

AEROPLAST

TRANSPARENT • ELASTIC • OCCLUSIVE • STERILE

EXTENSIVE STUDIES[1,2] have conclusively demonstrated Aeroplast's broad usefulness as a definitive surgical dressing. In many instances, lesions complicated by infection, and unresponsive to treatment when dressed by conservative methods, healed uneventfully when Aeroplast was substituted. Laparotomies, appendectomies, thoracotomies, ileostomies, herniorrhaphies, burns, skin graft donor sites, and compound and openly reduced fractures are typical of the broad variety of cases in which Aeroplast has been used to advantage.

1. Choy, D.S.J. and Wendt, W.E.: U.S. Armed Forces M. J. 3:1241, Sept. 1952.
2. Choy, D.S.J.: A.M.A. Arch. Surgery. *In Press.*

AEROPLAST provides new efficiency and versatility as a protective dressing for routine use in surgical and traumatic wounds, burns, abrasions, excoriation, etc.

Sprayed directly onto the lesion from a self-contained aerosol "bomb", Aeroplast dries rapidly to form a transparent, flexible, occlusive plastic film which seals contaminants out and vital fluids and electrolytes in. Biologically and chemically inert, it is non-toxic, non-sensitizing, and mildly bacteriostatic. As a replacement for conventional gauze dressings in all their varied applications, Aeroplast offers significant advantages:

AEROPLAST DRESSINGS ARE TOUGH AND FLEXIBLE. They remain in place despite friction or the stress of motion. They withstand washing. Yet they are easily removed by simple "peeling" without distress to the patient.

AEROPLAST DRESSINGS ARE IMPERMEABLE TO BACTERIA. Properly applied to aseptic lesions, sterility is maintained as long as the dressing is allowed to remain intact. In addition, Aeroplast in itself is bacteriostatic.

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AEROPLAST DRESSINGS ADHERE TO ANY DRY SURFACE OF THE BODY. Regardless of location and structure or the extensiveness of the area treated, Aeroplast dressings "fit" and maintain their integrity. They do not restrict circulation, respiration, or desirable movement.

AEROPLAST IS NON-TOXIC, NON-SENSITIZING, NON-ALLERGENIC. The vinyl resin base is inert; the film which forms is insoluble in body fluids; and the ethyl acetate-acetone solvent evaporates in seconds following application.

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AEROPLAST Liquid Surgical Dressing is an ethyl acetate-acetone solution of co-polymers of hydroxy-vinyl chloride-acetate and sebacic acid, 9.3% by weight, and modified maleic rosin ester, 3.1% by weight, with fluorochloro hydrocarbon gas as a propellant. STERILE.

Supplied in 6 oz. aerosol-type dispenser.

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brand of ***hydrocortisone***

CORTRIL ACETATE TOPICAL OINTMENT
in 1/6-ounce tubes in two strengths, 1.0% and 2.5%

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CORTRIL ACETATE AQUEOUS SUSPENSION
for intra-articular injection in 5-cc. vials, 25 mg. per cc.

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With the introduction of CORTRIL Topical Ointment, CORTRIL Ophthalmic Ointment, and CORTRIL Aqueous Suspension for intra-articular injection, significant and definite *anti-inflammatory* action is now possible at the local level *without systemic effect.*

in a wide variety of dermatoses

CORTRIL Topical Ointment, applied locally, is effective in allergic skin disorders. The unique topical action of this corticoid agent safely controls local edema, erythema, and inflammatory infiltration, and markedly relieves the distressing pruritic manifestations of atopic and contact dermatoses.

the anti-inflammatory hormone

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With CORTRIL Ophthalmic Ointment, local inflammatory edema is safely controlled and fibrous tissue proliferation and corneal vascularization which can result in scarring are significantly inhibited in conditions of the anterior chamber of the eye.

inflamed joints, sprains, and bursitis

Injected directly into arthritic joints and bursae, CORTRIL Aqueous Suspension provides a prompt and striking decrease in pain, stiffness, and swelling, entirely through local action.

CORTRIL and TERRAMYCIN when used concurrently provide combined anti-inflammatory and anti-infectious therapy— a desirable as well as a useful precaution in many indications.

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Solution Intravenous Calcium Disodium VERSENATE*

At Long Last...Safe...Effective Therapy in Lead Poisoning

Solution Calcium Disodium VERSENATE*, Riker, proves effective in the reduction of blood and depot lead in lead poisoning—acute or chronic, and in lead encephalopathy.

It is recommended for prophylactic use against exacerbations in chronic lead poisoning. It is worthy of trial in mercury and other heavy metal poisoning, and is of potential value for the removal of radioactive and nuclear fission products such as plutonium, yttrium, etc.

Supply—Calcium Disodium VERSENATE* is available in boxes of six 5 cc. ampuls, each containing 1 gram, for dilution and intravenous infusion. Detailed instructions accompany each ampul.

Literature available upon request.

Reference

Hardy, H. A., et. al.: Calcium Ethylenediaminetetraacetate in Treating Heavy Metal Poisoning, A. M. A. Arch. Ind. Hyg. and Occup. Med. 7:137 (1953).

HERE, for the first time, is effective treatment for heavy metal poisoning, without organ injury during excretion.

This achievement is made possible by chelation, a process long used in industry. In this reaction the metal atom is joined to other atoms in the molecule by both ordinary and coordinate valence forces (resonance bonds) which are responsible for depressing ionization of the metal atom. The resulting chelate is water soluble, nontoxic, virtually nonionized, and nonmetabolized, and is excreted as an intact molecule. Kidney damage does not result.

Solution Calcium Disodium VERSENATE* is the calcium chelate of ethylenediamine tetraacetic acid (EDTA). In the body calcium is displaced by lead forming the lead chelate which is rapidly excreted. It forms similar chelates with certain other heavy metals.

Solution Calcium Disodium VERSENATE* is recommended for administration—after proper dilution—by intravenous infusion only.

*Versenate is the registered trademark of the Bersworth Chemical Company.

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"COUGH...

one of the most frequent symptoms for which the patient seeks medical attention."[1]

SYNEPHRICOL®
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...relieves the cough due to colds
...eases the allergic cough

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Synephricol Thenfadil acts by prompt and prolonged decongestion of bronchial mucous membranes, by mild central sedation, and by decreasing sensitivity of the pharyngeal mucosa through antihistaminic action.

FORMULA:
(4 cc. teaspoonful)

Neo-Synephrine® hydrochloride	5.0 mg.
Thenfadil hydrochloride	4.0 mg.
Codeine phosphate*	8.7 mg.
Potassium guaiacol sulfonate	70.0 mg.
Ammonium chloride	70.0 mg.
Menthol	1.0 mg.
Chloroform	0.0166 cc.
Alcohol	8%

*Exempt narcotic

DOSAGE:

Adults—1 or 2 teaspoonfuls every two to four hours, not to exceed 5 doses in twenty-four hours.

Children 6 to 12 years—½ to 1 teaspoonful four or five times daily.

BOTTLES OF 1 PINT AND 1 U. S. GALLON.

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WINTHROP

1. Banyai, A. I.: Management of Cough in Daily Practice. *J.A.M.A.*, 148:501, Feb. 16, 1952.

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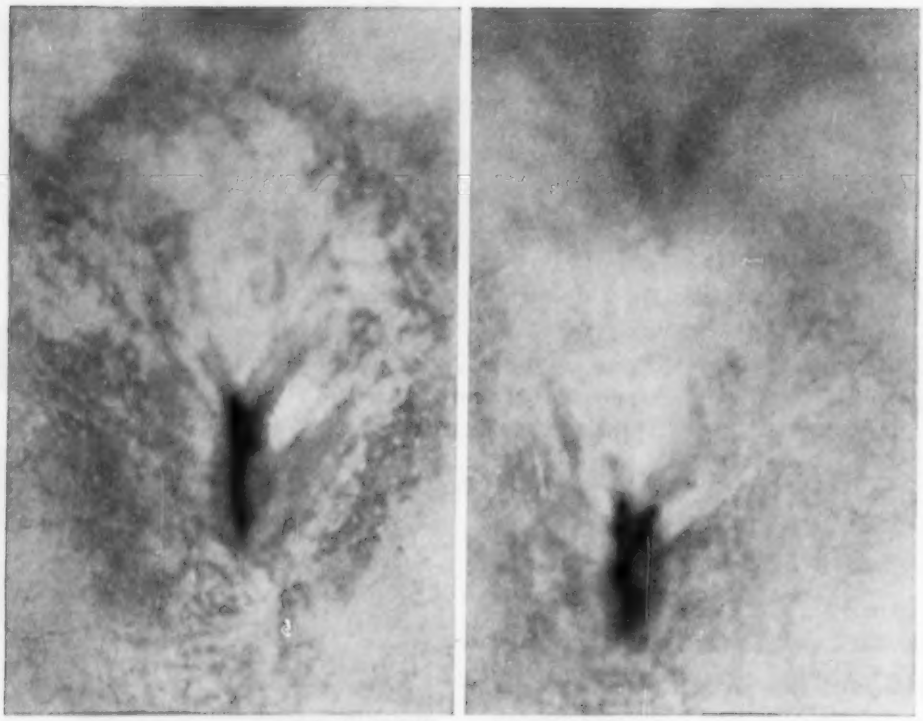

BEFORE TREATMENT AFTER TREATMENT courtesy of authors*

Profound and prolonged relief of pruritus ani

TOPICAL OINTMENT OF

HydroCortone®

ACETATE

(HYDROCORTISONE ACETATE, MERCK)

RESULTS: Topical Ointment of HYDROCORTONE Acetate (2.5%) was used to treat 29 patients with severe non-specific intractable pruritus ani. "Only three patients failed to derive lasting benefit from this treatment." "Perhaps the most interesting feature . . . is the small amount of ointment necessary to produce and maintain a beneficial effect." Furthermore, the ointment ". . . is not painful, does not soil clothing, and has no odor."
*Alexander, R. M. and Manhein, S. D., *J. Invest. Dermat.* **21**: 223-225, October 1953.

OTHER INDICATIONS: Non-specific pruritus vulvae and scroti, atopic dermatitis and contact dermatitis.

SUPPLIED: Topical Ointment of HYDROCORTONE Acetate, 1% and 2.5%, 5-Gm. tubes.

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HYDROCORTONE is the registered trade-mark of Merck & Co., Inc. for its brands of hydrocortisone.

simple, effective conception control

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"HANDS AWAY!"

. . . an order frequently repeated to the patient with pruritus, urticaria, contact dermatitis or multiple insect bites— but an order which can be gratefully followed when—

'PERAZIL'® brand CREAM 1%

CHLORCYCLIZINE HYDROCHLORIDE

. . . is the choice of the clinician for topical antihistamine therapy.

- provides prompt relief through a local anesthetic action
- provides prolonged relief through local counteraction of histamine
- minimal index of sensitization
- prepared in a cosmetic-type, non-greasy, cream base

TUBES OF 1 OZ.

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1 WHEN IT IS RELIABLY ABSORBED

"... the first oral preparation of penicillin which has in our experience been reliably absorbed in 100% of patients, irrespective of size and weight and using a standard dose of 300,000 units ... [it] was given irrespective of the time of meals and whether the stomach might be full or not"[1]; ... "may be given without regard to meals ..."[2,3]

2 WHEN ITS THERAPEUTIC EFFECTIVENESS IS ESTABLISHED

"The results presented indicate that the oral penicillin suspension studied by us is a satisfactory antibiotic for the treatment of some of the common infections of the respiratory tract caused by β-hemolytic streptococci" ... and uncomplicated pneumonias of childhood.[4]

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Bicillin "oral suspension is palatable, was accepted without difficulty by all patients in both groups [children and adults] and was well tolerated."[2]

"No children of any age have been disturbed, and the palatability of the product has made its administration easy."[1]

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Bicillin is highly insoluble in water. Its aqueous suspension, ready for immediate use, is stable for 2 years at ordinary room temperature—77°F. (25°C.). Refrigeration is unnecessary.

"The development of dibenzylethylenediamine dipenicillin is one of the important milestones in antibiotic therapy."[5]

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SUPPLIED: ORAL SUSPENSION BICILLIN:	Bottles of 2 fl. oz.; Two strengths: 300,000 units per tsp. (5 cc.). New! 150,000 units per tsp. (5 cc.).
TABLETS BICILLIN:	200,000 units; bottles of 36.
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1. Cathie, I.A.B., and MacFarlane, J.C.W.: Brit. M. J. 1:805 (April 11) 1953.
2. Coriell, L.L., and others: Antibiotics & Chemotherapy 3:357 (April) 1953.
3. Barach, A.L.: Geriatrics 8:423 (August) 1953
4. Finberg, L., Leventer, I., and Tramer, A.: Antibiotics & Chemotherapy 3:353 (April) 1953
5. Editorial: Antibiotics & Chemotherapy 3:347 (April) 1953.

hard-hitting antibiotic

ILOTYCIN

(Erythromycin, Lilly)

especially for staphylococcus, streptococcus, and pneumococcus infections

DOSAGE FORMS:

Tablets 'Ilotycin,' 100 and 200 mg. Average dose: 200 mg. every four to six hours.

'Ilotycin'

(Erythromycin, Lilly) ETHYL CARBONATE

Pediatric

100 mg. of 'Ilotycin' (as the ethyl carbonate) per teaspoonful (5 cc.)

AVERAGE DOSE:

Thirty-pound child: One teaspoonful every six hours.

Adults: Two teaspoonfuls every four hours.

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INDUSTRIAL MEDICINE AND SURGERY

JANUARY, 1954

Concepts of Allergic Sensitizations

THEIR ROLE IN PRODUCING OCCUPATIONAL DERMATOSES

A. ROSTENBERG, JR., M.D., Department of Dermatology
University of Illinois College of Medicine, Chicago

IT WILL be the purpose of this review to consider certain basic aspects of sensitizations and the importance of these in the genesis of occupational dermatoses. It is not intimated that most occupational dermatoses arise because of an allergic sensitization. In fact, it is reasonably well established that probably the majority of them develop because of a primary irritant mechanism.

Before proceeding further it is necessary to define certain terms. The definition of an occupational dermatosis does not present any particular difficulty, inasmuch as in most industrial communities there is a legal definition; consequently, even though this may be arbitrary it nevertheless is the governing concept. On the other hand, there is no definition of the term "allergy" which has any sort of official sanction. Indeed, there is a lack of agreement among authorities as to how this term should be defined. It is the writer's opinion that the following is the preferred definition: "allergy is an acquired specific alteration in the capacity of the host to react, brought about by an antibody mechanism." This definition is essentially that of Von Pirquet's, except for the final phrase, "brought about by an antibody mechanism." It is believed desirable to consider in some detail certain aspects of the definition, specifically the role of genetic factors and the significance of the proviso "brought about by an antibody mechanism." The term "acquired" indicates that the sensitization is not inherited; that is, that the sensitization *per se* is not genetically transmitted. A corollary of this statement is that there must have been a previous exposure, although in theory this exposure could actually have been *in utero*. It is very important to realize that the previous remarks do not imply that the ease with which a person becomes sensitized to a particular allergen may not be genetically determined. In fact, it would appear to be unquestionably true that individuals are born with different capacities for acquiring sensitizations. The influence of the genetic make-up has been reasonably well worked out for the immediate wheal (atopic) type of sensitivity.* It has not been worked out nearly as well in the case of the delayed eczematous type of sensitivity.* Some authors have gone so far as to suggest that genetic influences do not play a role in the development of the eczematous type of sensitization. It is this writer's conviction that that is not so. The experimental evidence certainly supports the view that genetic influences play an important role in the ease with which a person develops the delayed type of sensitivity. Chase[1] was able to breed guinea pigs selectively sensitizable to one or another simple chemical. Kallman and Reisner[2] and others have shown the importance of heredity in the development of tuberculosis. They studied human twins, contrasting the development of the disease in identical *versus* fraternal twins. The identical twins behaved very much alike, but the fraternal were often quite different. Now it is evident that the environmental surroundings for both types would necessarily be much the same so that a difference in behavior could be ascribed only to genetic influences. It should be stated that it is believed by many that the immunological process going on in the development of a disease such as tuberculosis is quite analagous to that going on in the genesis of a sensitization to a simple chemical.

In considering the role played by genetic influences, it is important to realize that they do not render the person more likely to develop allergic sensitizations in general but rather determine the ease with which either an immediate or delayed type of sensitization is developed and within the type possibly predispose towards becoming sensitized to particular substances. The important point is that an individual

*These terms are subsequently defined and contrasted.

who has a hereditary background which would lead one to believe that he is a likely candidate, say, for the development of an immediate type of sensitization, is not necessarily, by virtue of that, predisposed to develop an eczematous, delayed type of sensitivity. This is of obvious practical importance when considering hiring workers who have a family or personal history of asthma or hay fever and who are likely to be exposed to strong eczematous allergens. The evidence is that such persons are not more likely to develop an occupational dermatitis of an allergic nature than are persons without such a history, but such individuals would probably be more likely to develop immediate wheal type sensitivities if exposed to suitable allergens. On the other hand, workers who give a history of past eczematous eruptions from industrial allergens are probably poor risks for occupations where they would be exposed to potent eczematous sensitizers.

A FEW words as to why the final phrase in the definition of allergy, namely, "brought about by an antibody mechanism," is required. If this phrase is not appended the concept embraces such a wide heterogenous variety of biological phenomena that it becomes an almost useless one. For example, the tolerance acquired by alcoholics and morphine addicts is an example of a specifically acquired alteration in the capacity to react and consequently would be included in the definition. It would appear to go without saying that such alterations are not ordinarily considered when the term "allergy" is employed. Many other examples of this type of pharmacologic adaptation could be mentioned. Another example of a specific alteration in the capacity to react, but certainly not one that is ordinarily thought to be allergic, is the relative immunity acquired by dogs when fed sub-lethal doses of uranium nitrate. This presumably arises because of a metaplastic change in the tubules of the kidneys.[3] It would seem evident that these few examples suffice to point up the need for imposing some sort of biological restriction on the mechanisms by which the alteration in the capacity to react is brought about.

Many of the conditions classically considered to be allergic definitely depend on the presence of antibodies. The evidence concerning this is too extensive to go into, but possibly the clearest examples are passive transfer experiments, such as passive anaphylaxis or the Prausnitz-Kuestner phenomenon. On the other hand, in many conditions which are ordinarily considered to be allergic, and, indeed, in most of the conditions with which this article will concern itself, there is no evidence for the presence of antibodies that are demonstrable by any conventional techniques. What is then to be concluded—that these conditions are not allergic because conventional antibodies are not demonstrable? Or is it necessary to enlarge the concept of the term antibody? It is believed that this latter alternative is not only desirable but essential.

The most widely held explanation for the production and specificity of antibodies is what might be termed the theory of stereochemical complementariness. In a somewhat over-simplified fashion this theory asserts that antigen gets to the site of the globulin synthesis and there, by exerting electrochemical effects on the globulin molecule as it is being formed, causes certain structural modifications of its surface. These surface modifications are what give the globulin the ability to act as an antibody; and, by virtue of the fact that each antigen will presumably produce a more or less unique modification, the antibody is in turn unique, or, in other words, its activity is specifically directed against the configuration which imposed the alteration in its own structure.

This is not the place to go into details concerning the validity of such a hypothesis. Suffice it to say that while it adequately explains the specificity of antibodies it has other serious immunologic deficiencies. Burnet, some years ago, propounded an alternative theory which might be called the theory of enzymic adaptation.[4] This theory states, similarly to the preceding; (1) that antigen gets to the site of globulin synthesis; but, rather than remaining there as such, and causing changes in the globulin being synthesized, the antigen ultimately becomes degraded by the proteinases of the cells concerned with the synthesis of globulin; (2) as a consequence of this degradation, the enzyme systems of those cells become adapted to this new protein, namely, the antigenic material; (3) as a result of this adaptation, there is a specific alteration in the product produced by these same enzyme systems, namely, the globulin; and it is this change in the configuration of the globulin molecule which endows it with what is termed antibody properties. Again, the change will be specific, as it will be a reflection of the protein towards which the system has become adapted.

Based on Burnet's views, Rostenberg and Brunner[5] went one step further and hypothesized that the essence of being sensitized was the adaptation of an enzyme system to some alien protein. If the adaptation took place in a cell concerned with the synthesis of serum globulin, then there would be evidence for that adaptation in the form of altered circulating globulins, and the presence of these could be shown by various serological techniques. If, on the other hand, the enzymic adaptation took place in a cell or a system not concerned with the synthesis of serum globulin, then there would be no reason for there to be any modified circulating globulins; so that antibodies demonstrable by conventional techniques would not be present; yet, the cells in which the adapted enzyme systems had developed would be sensitized cells so that when they were exposed to the protein (antigen) which initiated the adaptation, an altered form of activity would be demonstrable. It is believed that the usual cell in which this enzymatic adaptation takes place is the primitive reticulum cell. It should be realized that this is a multipotential cell and can give rise to all of the cells that are ordinarily

thought to be concerned with immune activities. Another extremely important point is that the enzymatic adaptation can be passed on from a cell to its descendants. This, of course, helps explain the persistence of sensitizations in the absence of further contact with the antigen. From the point of view of this theory an antibody may be defined as an enzyme system or the product of an enzyme system which has become adapted so that it can interact with a specific alien protein. The term "alien" means protein that does not normally react with the enzyme in question. This does not necessarily imply that the alien protein is derived from a different species or for that matter from an individual other than the one in whom the enzymic adaptation has taken place.

IT MIGHT now be inquired as to what are the major influences which determine whether a sensitization to a given substance will develop. These are given in the form of an algebraic symbolism in Fig. 1.

Fig. 1 is to be interpreted as meaning that the genetic factor (G) multiplied by the intrinsic allergenicity of the compound in question (A) must equal or exceed some hypothetical level (k) in order for a clinical sensitization (S) to be manifest. From the nature of the relationship between G and A, it is evident that if one be high the other need not be. This merely symbolizes some well known facts, e.g., that more people get sensitized to poison ivy than to dandelions, and more to ragweed pollen than to white pine pollen. The reason for this presumably resides in the intrinsic allergenicity of the respective compounds inasmuch as the incidence of exposure is roughly equivalent. Now, with compounds of high allergenicity, e.g., poison ivy and ragweed pollen, little in the way of an appropriate genetic background is required. In other words, many people have a "good enough" background; whereas in the case of substances with low intrinsic allergenicity, e.g., dandelions and white pine pollen, a very special type of genetic background would be required in order for a sensitization to develop. It must not, however, be thought that the genetic make-up of the person and the intrinsic allergenicity of the compound are incapable of being influenced by other factors. They are, and that is the meaning of the exponents in Fig. 1. The q which modifies the A stands for quantitative factors. It is obvious that any allergen, no matter how strong it is, can be sufficiently diluted so that it becomes ineffective. The f which modifies the G stands for fortuitous factors. These are hard to enumerate with precision but are nonetheless real. An illustration of what is meant by fortuitous factors is an independent inflammation occurring at the time of exposure to an eczematous allergen. For example, it is reasonably well established that if an eczematous allergen is applied to the skin at the same time or shortly after a mild inflammatory stimulus was applied, e.g., heat, a mild chemical irritant, etc., the likelihood of an eczematous sensitization developing is increased. This has obvious

Schematic Representation of the Factors Influencing The Genesis of a Sensitization

$$G^f \cdot A^q \geqslant k = S$$

G = the genetic make-up of the host

A = the intrinsic allergenicity of the compound

f = adventitious factors which may influence the sensitizability of the host at that time

q = quantitative factors

k = some theoretical level which the product of $G^f \cdot A^q$ must reach in order for a sensitization to be detectable clinically

S = detectable sensitivity

Fig. 1.

implications for industrial processes. It is possible that the so-called immunologic adjuvants act in a similar fashion. Similarly, it is said that infections during the season of exposure to an allergen may enhance the likelihood of becoming sensitized to the allergen in question.

As has already been stated, there are two major varieties of sensitization, namely, the immediate and the delayed. The salient features of these are given in Table I.

This article will not go into detail concerning the features given in a somewhat over-simplified fashion in Table I, yet it is felt that a little more amplification is desirable. The division of allergic sensitizations into the two main categories of immediate and delayed types will probably be agreed upon by all workers. Certainly these two types present enough basic differences to lead one to believe that they are fundamentally different. When it comes to the subdivisions of each, one is on more tenuous grounds. It is obvious

TABLE I.
SALIENT FEATURES OF THE TWO VARIETIES OF SENSITIZATION

	Immediate		Delayed	
	Anaphylactic	Atopic	Bacterial	Eczematous
Usual Engendering Substances	Proteins		Micro-organisms	Simple Chemicals
Shock Tissue	Cells of: Capillaries, Mucous Glands, Smooth Muscle		R.E. Cells	R.E. Cells of Cutis
Accompanied by release of	Histamine, Heparin and other substances		None known	
Reaction time	Minutes		Hours	
Antibodies	Adaptation of a Globulin Synthesizing Enzyme System Yielding Antibodies as a Rule Detectable in the Serum. Anaphylactins	"P-K" Reagins	Adaptation of a Non-Globulin Synthesizing Enzyme System Yielding Antibodies as a Rule Not Detectable in the Serum.	
Transfer	With Serum		With Living Cells	
Effect of Addition of Antigen to a Culture of Cells From a Sensitized Animal	No Effect		Death of Cells	Unknown

from the table that the subdivisions are very close immunologically. Whether the atopic variety of the immediate type is in reality distinct from the anaphylactic variety is a debatable point, but the term "atopy" has become clinically entrenched; consequently, one has to be aware of it even though one might not feel that it warrants a special category. It is this writer's opinion that it is very dubious that "atopy" constitutes a unique anthropomorphic immunologic state that requires an independent label, as was suggested by the originators. It is important to stress the close immunologic relationships between the eczematous and bacterial varieties of the delayed sensitization because this is possibly not sufficiently well appreciated. In some of the older literature the eczematous sensitization was labelled as an epidermal sensitization. A distinction was attempted according to whether the epidermis was thought to be the shock tissue or whether the cutis was the shock tissue.* Such a distinction rests on an immunological fallacy in that the epidermis is certainly never the sole shock tissue. It is permissible to use the term epidermal sensitization synonomously with the term eczematous sensitization, provided there is the realization that the immunologic processes are not restricted to the epidermis. This point will be gone into in more detail.

TURNING now to the engendering substances for the eczematous variety of the delayed type, the phrase "simple chemicals" requires amplification. While admittedly one cannot define this phrase with precision, yet in general the immunochemist has definite ideas as to what he means by the term. A simple chemical can be defined as a compound whose structural configuration is known or for which it is reasonable to believe that such could be ascertained if desired. The definition is obviously not a sufficient condition inasmuch as it includes a wide variety of chemicals, e.g., water, salt, which do not yield sensitizations. The simple chemical must then possess additional attributes, and these are apparently the ability to unite with the protein molecule so as to confer new antigenic properties on that molecule presumably by changing mildly the surface configuration; yet the union between the simple chemical and the protein molecule must not be sufficiently violent so as to derange the protein structure markedly, lest the changed protein be rendered antigenically impotent. This explains why strong protein reactors such as sulphuric acid or nitric acid are not antigenic. Gell *et al*[6] in discussing the chemical features of eczematous sensitizers, state:

"Many chemical compounds which act as sensitizers have one general feature in common: they are capable of reacting with a group or groups in the molecule of a protein to form a

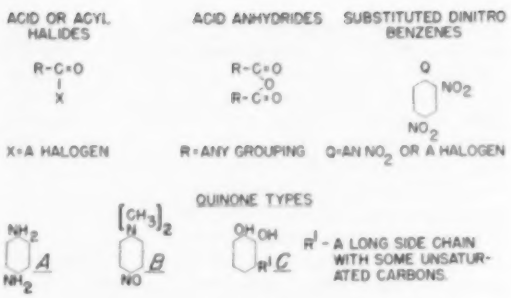

Fig. 2.

Examples of Strong Eczematous Sensitizers.

The quinone types are examples of compounds that sensitize by going through various intermediate stages until a quinone is formed. It is believed that it is in this form that the conjugation with body protein takes place.

Compound A is a paraphenylenediamine.

Compound B is paranitrosodimethylaniline.

Compound C is a substituted catechol. An active principle of poison ivy is believed to be n-penta decyl catechol.

In the case of the substituted dinitrobenzenes two factors chiefly determine their allergenicity.

(a) the grouping that is at Q;

(b) the relative positions of the three substituents.

If electron-repelling groups, such as OH or NH_2, are put in at Q the compound has a much reduced sensitizing potential. The arrangement of the substituents as shown, namely the 1-2-4 position is the most favorable one from the point of view of the compound's sensitizing potential. The 1-2-3 arrangement is less favorable, and the 1-3-5 arrangement is least favorable. The presumed reason for the varying allergenicity among the position isomers is probably a reflection of the ease with which the compound can conjugate with body protein.

conjugate. A second type of sensitizer is not able itself to combine with protein, but may be metabolized in the body to a derivative possessing such powers of combination. There may be a third category of sensitizers which do not react chemically but form strong adsorption complexes with protein. In any case the conjugate or adsorption complex so formed will become antigenically distinct from the parent protein, and if the sensitizer gains access to the tissues of an animal the proteins of the latter may be rendered antigenic.

"So far as the limited field of skin sensitization is concerned it may be regarded as proved that *in vivo* antigen formation of this type takes. Typical powerful skin sensitizers are acid halides, some acid anhydrides, and benzene compounds containing a reactive halogen atom, all of which can combine with the amino groups of protein; into this class also fall tetryl and trinitorophenetole (cf. Gell, 1945). The arsenoxides in addition, which combine with protein SH groups, are sensitizing agents. The less direct type of sensitizer is exemplified by such compounds as p-phenylenediamine and polyhydric phenols (e.g., the active principle of poison ivy); these are probably oxidized in the body to quinones, which in turn react with proteins."

*The term "shock tissue" may be defined as the tissue in which the antigen-antibody union takes place or as the tissue which bears the brunt of the consequences of such union. The former would be the primary and the latter the secondary shock tissue. In the light of present knowledge it is not ordinarily practicable to distinguish between the two.

Fig. 2 gives the formulas of some strong eczematous sensitizers of the types mentioned.

Reverting to a consideration of the shock tissue in the eczematous sensitization, it becomes more obvious as to why there must be an epidermal component, yet this tissue may not be in an immunological sense the shock tissue. The eczematous sensitization probably differs from all the others in that in this variety the full antigen is manufactured *in vivo*, whereas in the others it presumably exists as such outside of the body. Now it is obvious that if a simple chemical be applied to the skin surface, as it trickles through the epidermis it will presumably unite with various proteins and, probably other substances that are in this area. In other words, a chemical conjugation is taking place *in situ* and it is not surprising that the epidermis which is bearing the brunt of this reaction should portray pathological alterations as a consequence, but that does not mean that these alterations arise because of immunologic processes. Indeed the evidence for this view is overwhelming in that no pathologist can tell by looking at a section of tissue, whether an antigen or a primary irritant or both had been applied.

IT WOULD now seem appropriate to discuss insofar as is known the sequence of events in the development of a sensitization to a simple chemical. The first step, as has already been intimated, is the conjugation of the chemical with body protein, thereby rendering this antigenic. It should be emphasized that to develop an eczematous sensitization the simple chemical must be applied to the skin, and that the extra-cutaneous injection of the simple chemical does NOT ordinarily cause an eczematous sensitization to develop. While all the possible interpretations of this observation cannot be gone into here (see Rostenberg,[7]), two should be mentioned. First, that the application of the simple chemical to the surface of the skin may utilize some of the cutaneous lipids as adjuvants in the development of the delayed type of hypersensitivity (Raffel and Forney,[8]). Second, the combination of the chemical with some of the proteins may yield conjugated proteins with immunologic properties not obtainable by extracutaneous administration. Regardless of the reasons for the necessity of the cutaneous application, it is believed that some of the conjugated protein is picked up by macrophages and possibly other cells in the cutis and causes in these cells the enzymatic adaptation already alluded to. Some of the conjugated protein surely finds its way into the regional lymphatics and is carried by these to the regional nodes where presumably much of the enzymatic adaptation takes place. A small amount of the conjugated material may wend its way via the thoracic duct into the general circulation and then be carried to the spleen, etc., and be ultimately picked up by various cells of the reticulo-endothelial system, causing an enzymatic adaptation in them. It is thus seen that the application of the simple chemical to even a relatively small skin area can engender a widespread enzymatic adaptation. The next problem is how does the eczematous reaction develop in the already sensitized person when he reencounters the antigen. First it is necessary that the simple chemical again combine with the protein at the site of application. For example, a person strongly sensitive to 2:4 dinitrochlorobenzene will not react to m-dinitrobenzene even though this is certainly the haptenic portion of the conjugated molecule. The reason for the failure of reaction is because there is no handle, so to speak, by which the m-dinitrobenzene can attach. (Rostenberg and Kanof,[9]; Eisen, *et al*,[10]) Thus in the case of m-dinitrobenzene the full antigen cannot be made in vivo.

It is suggested that this conjugate formation in vivo damages slightly the capillary loops in the upper corium so as to alter their permeability, which allows the escape of cells from these vessels, but in a normal person, i.e., in a person whose cells do not have an enzyme system adapted to react with the conjugated protein, this mild inflammatory process (which might not be clinically evident) rapidly subsides. In the specifically sensitized person, i.e., one who has cells with an enzyme system specifically adapted to react with the conjugated protein, such cells, as they escape from the capillary loops, interact, are damaged (possibly destroyed), and the inflammation is added to until it becomes grossly evident.

Andrew and Andrew[11] believe that lymphocytes normally invade the epidermis and become transformed into epidermal cells. This view, however, does not have general acceptance. If this were true, the eczematous reaction would be very easy to explain, the invading lymphocytes, some of which would have the adapted enzyme systems, confer this new enzymatic property to the cells of the epidermis; consequently, when the simple chemical is applied and the antigen formed there, it immediately finds cells capable of reacting with it.

IT MIGHT be inquired as to the nature of the damage inflicted on the sensitized cell by the antigen and how a vesicular response develops. While no explicit answers can be given, it would appear that hypotheses which seem reasonable can be constructed. It is suggested that the antigen interferes with certain of the cells' enzyme systems. There is inferential evidence that this may be a pyruvate oxidase system. This system is known to be attacked by many primarily vesiculating agents (Thompson[12]). By analogy it is thought that in the eczematous response, which is a vesicular one, the antigen either directly or indirectly interferes with this same enzyme system (Frazier and Small[13]). Admittedly, all of this is at a very speculative level but as a working hypothesis it has some experimental basis, and a working hypothesis is needed as a guide for further experimentation.

When a sensitization develops it is well known that it does not appear immediately and fully developed, but that a certain time is required. For convenience in discussing sensitization phenom-

ena, the following time divisions in the development of a sensitization can be made even though the divisions are somewhat arbitrary.

1. *The Period of Indifference or Refractoriness Towards Sensitization.* By this period is meant the time between the first exposure to the allergen and the time at which one starts to become sensitized to the allergen. This period can vary from zero to an individual's lifetime. In other words, an individual might start developing a sensitization to a substance at his first contact or he might never develop a sensitivity despite repeated exposures. From the point of view of industry this is the important period. There is some evidence,[14] admittedly imperfect, that if a worker does not become sensitized relatively early in the course of his exposure to an eczematous allergen it is not too likely that he will. It is, however, important to emphasize that there many exceptions.

2. *The Period for the Incubation of the Sensitization.* This period is defined as the time from the beginning of the development of a sensitization to the time at which evidence of such a sensitization becomes manifest. This is, as a rule, around nine days but can be shortened by a few days or prolonged by a week or more. Obviously, in actual life the length of this and the other periods is difficult to determine with accuracy because ordinarily one cannot be sure when the first exposure was or when subsequent exposures occurred. Under experimental circumstances, for example, by applying 2:4 dinitrochlorobenzene to the skin of a guinea pig, one can, with quite some degree of precision, measure the length of these periods.

3. *The Period for the Incubation of the Reaction.* This is the time required for the development of a reaction in an already sensitized individual when again exposed to the allergen. The length of this period depends primarily on which type of sensitivity is to be elicited. In the case of the immediate type, it takes only a few minutes; whereas in the case of the delayed type it needs several hours. This period can be influenced in a minor way by quantitative factors and by the route of administration; but the essential point is that in the delayed type, no matter how large the quantities (assuming these are not primarily toxic) and no matter what the route, the reaction requires several hours for its development.

4. *Period of the Persistence of the Sensitization.* A discussion of the length of this period only becomes meaningful provided an additional qualification is made, namely, that there is no further exposure to the allergen. In other words, the caption for this period should be rephrased to read: "The period for the persistence of the sensitization after the last contact with the allergen or an immunologically equivalent material." There is no explicit answer in terms of time to this, but it can be stated that as a rule all sensitizations tend to disappear, but the time required for their disappearance will be markedly influenced by how strongly the sensitization was originally impressed, which in turn is determined in part by the number of exposures and the quantity of the allergen with which the individual originally came into contact.

THIS aspect warrants further discussion, not only because of its intrinsic theoretical interest, but because it is of obvious importance regarding desensitization and prognosis concerning those who have become sensitized. In industry one is often confronted with the question, what will be the fate of the worker who develops an allergic eczematous sensitization to some material he handles?

Fig. 3 endeavors to depict in a schematic way the course of a sensitization according to the frequency of contact with the antigen after the sensitization has developed.

Diagram "A" of Fig. 3 illustrates the course of a sensitization when, after some period of contact, there is no further contact with the antigen. This is the behavior of a sensitization under controlled experimental conditions. It will be noticed that the line indicating the intensity of the sensitization bifurcates. The reason for the bifurcation is that it really is not known whether the sensitization reaches zero or whether it recedes to such a low level that for all practical purposes it is non-existent—in the terms of the diagram this would be equivalent to asymptotically approaching zero.

Diagram "B" of Fig. 3 illustrates the course of a sensitization under usual conditions where the level of the sensitivity is maintained more or less in *status quo* because there are sporadic re-encounters with the antigen.

Diagram "C" of Fig. 3 indicates the course of a sensitization under so-called desensitizing or hardening procedures. In this situation, by virtue of repeated, massive contacts with the allergen, for reasons that are unknown, the level of the sensitivity becomes depressed. In other words, the patient becomes more tolerant of the antigen. The diagram should have been continued to indicate that if contact with the antigen is stopped the level of the sensitivity would rise. This, of course, means that there has not been any true desensitization in the sense of losing or abolishing the sensitivity; but rather the level of it has merely been depressed. This point is considered in more detail subsequently; as it is believed that the failure to distinguish between "desensitization" and "tolerance" has been the source of much confusion in the literature on this subject.

AS WILL be recalled, it was stated that the basis of an allergic sensitization was the adaptation of an enzyme system. Now, it has been shown a bacterial cell which has become adapted so that it can utilize some new substrate loses this ability, if contact with the new substrate is stopped.

It would thus appear that if total removal from an antigen is achieved, the sensitization will disappear; or, in other words, the adapted enzyme system will revert. Just how long this will take depends on a variety of factors which cannot be given explicitly, but probably among them are

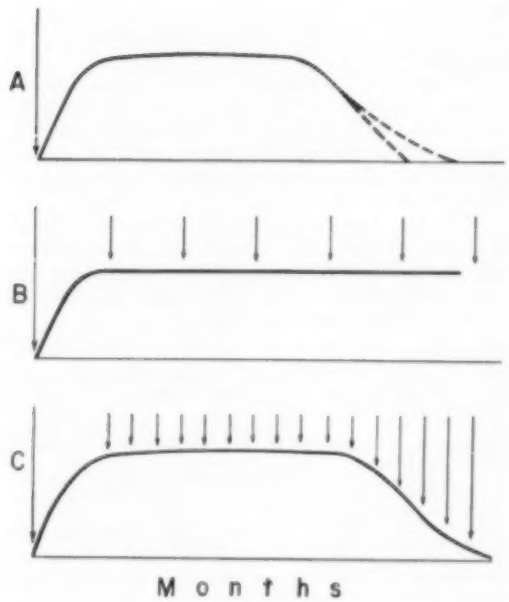

Fig. 3.

Course of Allergic Eczematous Contact Dermatitis. The abscissa denotes time and the ordinate the intensity of the sensitization; consequently, the graph indicates the level of the sensitivity at varying periods. The arrows indicate the occasions on which there was contact with the antigen. The significance of the three diagrams is discussed in the body of the text.

the genetic make-up of the host, the nature of the antigen, the concentration of the antigen at the time of initial exposure, and the number of times the sensitized individual has met the antigen. There is also evidence that different antibodies, even though called into being by the same gross antigenic stimulus, may endure for quite different periods.

Indeed, there is evidence that if an enzymatic system becomes sufficiently adapted it may not lose this adaptation for its lifetime. The disease syphilis provides interesting examples of this. If an individual with syphilis who has more or less recently acquired the infection is adequately treated, his blood serology which has been positive will now revert to normal. On the other hand, if the disease was of many years' duration at the time treatment was started, even though symptomatic cure may be achieved, serologic cure may be accomplished only with difficulty. If a congenital syphilitic child is not treated, say, until he is two or more years of age, it is exceedingly questionable whether the Wassermann can ever be rendered negative. In other words, the enzyme system which produces the antibody (protein) responsible for the Wassermann reaction goes on making this material even though the original inciting agent, namely, the spirochete, has presumably been destroyed.

The previous remarks apply to desensitization in the true meaning of the word, namely, that the sensitization is actually lost. Ordinarily, the term desensitization is used to refer to a very different state, which is an increase in the tolerance of the allergic towards the allergen. This type of tolerance is seen in industry in the phenomenon of "hardening," in which the worker, if he continues to stick it out, ultimately reaches a point where he can handle the material with more or less impunity. This is, of course, analogous to what is achieved by so-called desensitization treatments of the allergic asthmatic or the hay fever sufferer. A patient successfully treated by the "desensitizing injections" becomes more tolerant but not desensitized. The immunologic means by which this is brought about is poorly understood and will not be discussed. Such tolerance is actually the converse of desensitization because if the worker is now removed from the material which he handles with impunity, he loses his hardening. It should be realized that "hardening" in industry may be brought about by non-allergic means, e.g., the horny layer of the skin may thicken, or by virtue of some metaplastic alteration the skin may become more tolerant of the irritant.

A good discussion of the problem of hardening in industry is given by Peck, Gant and Schwartz.[15] They point out that the phenomenon does not always occur, and that the "hardening" is a relative state—in other words, the worker is more tolerant of the material than he was but he is not absolutely immune so that any concentration can be handled with impunity. Morgan[16] gives a good review of the general problem of the persistence of a sensitivity with special emphasis on nickel. However, neither Peck *et al* nor Morgan distinguish between lack of reactivity because of a loss of the sensitivity or because of the attainment of tolerance. The failure to make this differentiation, in this writer's opinion, serves to becloud the problem.

To sum up this brief discussion of desensitization versus hardening, it is pointed out that a lack of reactivity may be reached by either of these roads but that they are separate roads, meaning by that that quite different processes are taking place in the host. By virtue of this, the external conditions necessary for their development are diametrically opposite—absence of contact in the case of desensitization and persistence of contact in the case of hardening. For the development of either of these states there are surely many relevant factors besides the ones just mentioned of absence or of contact; consequently, it is not surprising that often neither goal is attained.

IN CONCLUDING this paper on certain theoretical aspects of allergy and their relation to the development of allergic industrial dermatoses, it would seem reasonable to discuss the criteria which can be used for deciding whether or not a given manifestation develops on an allergic basis. The usual ones offered are:

1. History of a previous exposure.
2. Aberrance of the reaction from the usual one engendered by the compound in question.

3. Deviation of the reacting individual from others similarly exposed.

4. Specificity.

5. Presence of an antibody system.

The question now arises as to the validity and utility of these criteria. First as to the necessity of a previous exposure. While, as has already been pointed out, this is an essential point in the development of an allergic reaction, on the practical side this fact is usually of little value. The reasons for this are more or less self-evident. In modern life people have such a variety of contacts, many of them being more or less unknown to the individual, so that history concerning a previous exposure is almost of necessity meaningless, especially when, as has already been mentioned, the exposure might have been intrauterine. On occasion, however, and this is probably particularly true in industry, this point may have a practical value. If a worker comes into contact with a newly synthesized substance which is chemically, and, presumably because of that, immunologically, unrelated to any other existing substance, and develops a reaction on his first exposure, meaning within a few days after contact, it would be presumptive evidence that the reaction he manifests is not on an allergic basis.

The second point is one that is often used but in reality has very little validity in that there are many types of reactions which are aberrant from the usual one engendered by a given compound, yet which are not allergic. In other words, aberrant reactions can develop by a variety of mechanisms only one of which is the antibody mechanism of the allergic reaction. A fuller discussion of these in the genesis of drug reactions is given by Rostenberg and Webster.[17]

The third point is essentially unsound, but has as a rule some practical weight. While basically it is not true that the individual who develops a sensitization will necessarily differ in this respect from most of his fellow men similarly exposed, practically as a rule only a few do develop reactions in contradistinction to the incidence of reactions with primary irritants. That is, most allergens are not sufficiently strong so that they will, under given conditions of exposure, sensitize all of the individuals who come into contact with them (recall Fig. 1); consequently, under the usual conditions of exposure only a relatively small percentage of individuals become sensitized. Under experimental conditions it can, however, be shown that if a suitably strong allergen is selected close to 100% of the population can be sensitized.

The point of specificity is one that is of theoretical importance, but not of much practical value in arriving at a decision. Of course, what is meant is that the reaction which develops will be elicited only by a certain substance or by a few close chemical relatives of it.

The final point, namely, the demonstration of antibody system, is theoretically the deciding one, but practically, for reasons that have already been gone into, it is, as a rule, not feasible to demonstrate such a system.

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Not the Work . . . .

It might be wise for those of us who have an opportunity to guide the medical destiny of industry to be a little cautious in attributing all the so-called stress disorders solely to occupation. My contention here is that work *per se* is not necessarily harmful. Many of the so-called stress diseases have nothing to do with stress. They are the results of accident, including infection; or of the kind of nervous system with which one is endowed; or of the inexorable aging process which begins at birth; or of improper habits. And bad habits are probably more common among loafers whose major object in life is to escape stress of any kind.

—From "The Stress Disorders," by William P. Shepard, M.D., presented at the Medical Conference of the Eighteenth Annual Meeting, Industrial Hygiene Foundation, Pittsburgh, November 18, 1953.

Tuberculosis Control in Industry

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TUBERCULOSIS control in industry is important chiefly because industry is usually located in the larger population centers where the tuberculosis rates are the highest and where there is, generally speaking, a lag in the over-all reduction of tuberculosis morbidity and mortality.

Tuberculosis control measures in industry should consist of the following:

1. Pre-employment x-rays.
2. Periodic x-ray check-ups on employees.
3. No discrimination against hiring arrested cases of tuberculosis.
4. Job placement under medical supervision in non-hazardous positions.
5. Tuberculosis health education to be conducted among employees.
6. Cooperation of industrial medical units with local health departments, tuberculosis agencies, and family physicians, especially in regard to reporting cases and in obtaining proper clinical check-up examinations and any necessary treatment.

Pre-Employment X-Rays

THE x-ray itself is the only effective way of determining the presence of tuberculosis, and without it practically all of the early cases will be missed, and most of the far advanced, if one depends entirely on history and physical examination. The x-ray is of value to the individual rayed because it can lead to the discovery of disease in the early treatable stage; it is of value to fellow-workers who will not have to be unduly exposed to a contagious disease; it is certainly of value to the insurance underwriters, and also to the company because it will obtain for them healthy, and as far as tuberculosis is concerned, permanent employees. But most of all, pre-employment x-rays are excellent case finding methods of tremendous importance in any community. Very often an individual will have a "fed-up" feeling concerning his work on the farm or elsewhere, and will come to an industrial center to get an easy job in a factory, only to find out that the fed-up feeling was actually an early symptom of tuberculosis.

As an illustration of its value in case-finding the following Table is presented which covers a six-year period from 1947 to 1952, during which time 64,984 pre-employment x-rays were taken at Caterpillar Tractor Company.

Presented at the 1953 meeting of the Mississippi Valley Trudeau Society, Minneapolis.

Interviewing an ex-sanitarium patient for job placement.

CATERPILLAR TRACTOR COMPANY
PRE-EMPLOYMENT X-RAY (1947-1952)
Total number of films, 64,984

Pulmonary tuberculosis	Number	Permitted to work
Active	65	0
Pleural effusion	10	0
Arrested and inactive	103	103*
Unclassified (TB to be ruled out)	22	20*

*Periodic x-rays required

Sixty-five cases of tuberculosis were discovered, and 10 cases of pleural effusion. This is a case-finding rate of more than one per every thousand x-rayed. In addition there were 103 arrested and inactive cases, plus 22 suspected cases of tuberculosis. All of the inactive cases and most of the suspected cases were permitted to work; however, they were not assigned to work in the foundry, and were required to have periodic x-ray and chest examinations.

The pre-employment x-ray also leads to the discovery of many other conditions.

The second column in the following table gives the number of these people with lung abnormalities who were permitted to work.

In smaller industries where x-ray machines are not available in the Medical Department, several industries can combine and have films taken by a commercial x-ray survey company, or a contract can be made with a hospital or a roentgen-

	Number	Permitted to work
Increased pulmonic markings	2,646	2,646
Not assigned to work in foundry		
Evidence of definite lung pathology:		
Silicosis	25	19*
Excessive calcification	388	388
Pleurisy healed	149	149
Bronchiectasis	19	18
Healed lung abscess	7	6
Cystic disease	5	4
Pneumothorax (spontaneous)	9	7
Suspect tumor	9	2
Chronic fibrosis	101	101*
Pneumonitis	64	48*
Emphysema	48	48
Fungus infection	2	2

*Periodic x-rays required.

ologist to take these pictures. In some instances the local chest clinic with the aid of the local tuberculosis society can be called on to help.

Periodic X-Ray Check-up of Employees

ANNUAL x-rays on all employees would be ideal, and this is being done in some industries. There are certain classes of employees, however, who should be required to have periodic x-ray check-ups. These are: foundry workers, grinders, and all those showing definite lung pathology. All cases of arrested or suspected tuberculosis must have periodic chest and x-ray examinations, which can usually be done by a private physician or the local chest clinic. This should be made a requirement for continuing work.

In Peoria an x-ray survey is conducted every two years. The State Health Department furnishes the mobile x-ray units, the local Tuberculosis Society takes care of the publicity and reporting, and the city and county tuberculosis clinics do the follow-up work.

MASS CHEST X-RAY SURVEY
CATERPILLAR TRACTOR SUMMARY

	1944	1947	1951
Total x-rays taken	13,547	16,559	23,196
Tbc active cases	22	2—one was known case of clinic.	1 (new case)
Tbc active quest.	33—4 were known cases of clinic	7—1 was known case of clinic.	3 (new cases for follow-up)
Tbc inactive	14	29—17 were known cases No cases of activity in follow-up	50—16 were known cases No cases of activity in follow-up.
Total tbc. cases	69	38	54
	80 other cases were under observation and all proved to be non-tbc. cases	121 other cases were under observation. Only one turned out to be a tbc. case	36 other cases were under observation. None turned out as proved tbc. cases

Every other survey will emphasize industry. X-ray films are taken on a voluntary basis, the units are located either inside the factories or close by, and the pictures are taken on company time. Statistics from the Caterpillar Tractor

Teaching mathematics: Rehabilitation training to develop skill in suitable industrial employment.

Company of these surveys taken in 1944, 1947, and 1951 show that 22 active cases of tuberculosis were discovered in 1944, two in 1947, and only one in 1951. The 23,196 individuals x-rayed in 1951 represent 96% of all available personnel. Other industries also have a reduction in cases found, but not as great as at Caterpillar. The difference may be that since September, 1945, Caterpillar has had compulsory pre-employment x-rays—many of the other industries have no such requirement. If one considers the ratio of active cases found to total x-rays taken, in 1951 the incidence of tuberculosis was six times greater in other industries than at Caterpillar.

INDUSTRIAL X-RAY SURVEYS

	1944	1947	1951
Caterpillar:			
X-rays	13,547	16,559	23,196
Active T.B.	22	2	1—(.00004%)
Other Industries:			
X-rays	12,129	21,696	15,165
Active T.B.	18	6	4—(.00026%)

No Discrimination Against Hiring ex-TB Patients

ONE of the great stumbling blocks in tuberculosis control has long been the stigma attached to the "ex-san" case who wants to go to work. Industry, by adopting an attitude of hiring these individuals, will not only do the community a great service but also will be able to get valuable trained employees who otherwise would not be available, and there will be an improvement in the employee-employer relationship. An additional advantage is that which is found with all handicapped employees—the turnover rate is much lower. These "ex-san" patients practically never quit. Most of the industries in the Peoria area will hire "ex-san" patients under certain conditions. The first is that a certificate from a physician or clinic should be presented stating that the arrested case is able to work and is noncontagious; the second is that frequent periodic check-up examinations will be made. With proper

Building work tolerance in Peoria Production Shop preliminary to full-time employment in industry.

job placement it has been the experience of these industries that the risk is very small and that there has been no abnormal loss by insurance companies. Specifically, in a six-year period Caterpillar Tractor Company had hired 103 cases of arrested or inactive tuberculosis. Of these, only three have broken down.

The first man was hired originally in 1947, with pneumothorax. He had a breakdown in 1949, was hospitalized for six months, rehired in 1950. He is now working in one of the offices.

The second man was hired early in 1947 after he had had a period of sanatorium care. He broke down in July, 1949, stayed in the sanatorium seven months, and was rehired in October, 1952. He is working in the shipping department.

The third individual was hired in 1949 as an arrested case of tuberculosis. In February, 1953, he had a breakdown, came to the sanatorium, a thoracoplasty was performed, and he was discharged from the sanatorium in September, 1953, and will be able to return to work in January, 1954. His job is in the parts department.

The highly organized rehabilitation departments now existing in most sanatoria have contributed greatly to the success of hiring patients in industry. Whenever anyone comes from an industry into the sanatorium in Peoria he is carefully investigated from the vocational angle. Consultation with the personnel department of the industry is obtained, and then he is given adequate rehabilitation courses so that he may return safely to the same industry. In Peoria there is the additional advantage of the Peoria Production Shop which is a sheltered work-shop where patients can work after being discharged from the sanatorium starting out on even one or two hours a day and gradually increasing their work tolerance until they can go back to their full-time job. While doing this they are paid a wage which will help tide them over this period of convalescence.

Job Placement under Medical Supervision

AN EFFECTIVE job placement procedure is of extreme importance in employing any handicapped individual and is of special importance in employment of "ex-san" cases, cases of potential tuberculosis, and all other chest conditions. Too often in industry a certain individual is placed in a certain job with the approval of the Medical Department only to have him later transferred by some foreman or supervisor who knows nothing about his physical condition. To prevent this, all the man's records should be stamped with "Do not change job assignment without consulting Medical Division." To place an individual in a satisfactory job is a fraternity of effort. This includes the family physician, the industrial physician, the personnel director, the supervisors, foremen, the safety engineers—all of these must visualize where this man can work. There are two things the industrial physician must think about in the work assignment—first the job, and then the work area. Arrested cases of tuberculosis should not be assigned to the foundry or anywhere where there is excessive dust (whether this dust is silica or not), sanding operations, grinding, welding, heavy labor, places where there are extreme temperature changes, or in dampness. There are many positions, however, that are available to arrested cases. Factories are becoming so mechanized in recent times that hardly any work is left which requires heavy lifting, pushing, or pulling. A series of hoists and conveyor trucks has largely taken away the heavy labor factor. Health and safety codes have advanced also to such a stage that there are few places left in a large industry which are not completely safe for everyone.

Tuberculosis Health Education

TUBERCULOSIS health education can be carried on among employees in industry as part of a general over-all health and accident education program. The supervisors and foremen should be reminded that it is their duty to advise those working under them to seek medical attention if they appear to be ill. Any employee who develops a chronic cough, persistent loss of weight, lack of pep, should be referred to the Medical Department. An occasional article on tuberculosis could appear in any of the publications of the industry. Pamphlets on tuberculosis should be made available, especially in the Medical Department, so that anyone who wishes can take one and read

it. These can be obtained through the local tuberculosis associations. During the x-ray survey that comes to the community there is additional opportunity for health education—posters on bulletin boards; literature distributed by the management, perhaps with the pay checks; announcements made at various meetings of employees, such as union meetings; supervisors' meetings; and frequently a personal letter from the management to each employee will be worthwhile.

After the x-ray has been completed in an industrial survey, a billfold-size card can be sent out to each employee who has a negative reading, along with some additional literature about tuberculosis. Tuberculosis health education is very important in over-all tuberculosis control, and a genuine effort should be made on the part of the Medical Department in industry to see that this important item is not neglected.

Cooperation with Community Resources

THE LAST feature in tuberculosis control in industry is the cooperation of the industrial medical units of local health departments, tuberculosis agencies, and family physicians. It is not enough to reject the individual for tuberculosis or some chest ailment and then forget all about him. It is very important that all cases of suspected tuberculosis be reported to the local health department and a conference with the individual should be obtained by the Medical Department, acquainting him with the findings and assisting him in seeking further observation and study by the family physician or tuberculosis clinic and advising him of the importance of such procedures. If this is not done, then tuberculosis cases usually will get another job with some firm which does not take pre-employment x-rays. If the rejectee is from out of the community, then he should be advised to seek this medical care back from where he came and, when the matter is reported to the local health authorities, his former address should be given so that the report can be transmitted to the health authorities of his original residence.

In conclusion, tuberculosis control in industry is similar to tuberculosis control in the community. It should not be considered a separate problem in itself but should be made an integral part of an over-all health and accident-prevention program. The industrial physician has a great opportunity to serve his community in this part of the field of preventive medicine.

Ear in the Door

IF WE ARE to recognize and adopt the principle of awards for physiologic, functional and social losses where there is no wage-loss, the danger is, because of the infinite complexity of the human anatomy, that there can be no logical stopping point or terminus. There are many different organs in the body which may develop a physiologic loss or show some deterioration or deviation from the normal. If we apply this principle to the ear, how can we consistently say that it is unapplicable to the stomach, the liver, the kidney, the heart, the bones, and the vascular and circulatory system? If we are to pay for non-economic occupational impairment of the sense of hearing it can be urged with just as much reason that we should pay for non-economic occupational impairment of the sense of vision, the sense of smell, the sense of touch, the sense of taste, and all the other senses. And if we are to compensate for physiologic and physical losses it can, as the next step, be argued that we should also, under the theories of endocrinology and psychosomatic medicine, provide indemnity for all non-economic psychiatric decrepitudes which the employee may blame on his occupation, including such emotional states as apprehension, nervousness, and frustration.

—From "Insurance Aspects of Industrial Noise," by NOEL S. SYMONS, of Brown, Kelly, Turner & Symons, Buffalo, New York, presented at the Annual Meeting of the American Mutual Alliance, Chicago, November 18, 1953.

Lung Cancer and the Tobacco Smoking Habit

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RATHER far-reaching, if not extravagant, claims recently have been advanced as to the important, if not predominant, role which cigarette smoking is alleged to have played in the production of lung cancer and its progressive rise in frequency during the past 50 years. A critical and sober analysis of the evidence offered in support of these assertions is in order not only for reasons of scientific accuracy but also for medicolegal reasons and especially for determining the direction of future epidemiologic research and of control activities in the field of lung cancer.

A few years after there developed a growing appreciation of the rapid increase of cancer of the lung, the smoking of tobacco, particularly, cigarettes, was suspected by some investigators as one of the causes, or the main cause, of this phenomenon (Perret; Adler; Wassink, Arkin and Wagner; McCord; Bogen and Loomis; Grace; Thys; Syrek; McNally; Strnad; Joannovic; Berblinger; Hochstaetter; Schoenherr), although such connections were denied by Staehelin and Hintze.

Lickint, in 1930, however, was the first to make definite claims in this respect, for which he sought support in the observations of Seyfarth and of Young, Russell, Brownlee and Collis concerning the excessive frequency of lung cancer among restaurant owners and waiters professionally exposed to tobacco smoke. These assertions were repeated by Hoffman, Ferrari, Brockbank, Roffo, Müller, Weigl, and Lehmann, as to the lung, and by Roffo, Herrmann, and Jackson and Jackson as to the larynx. Müller did the first statistical study on the relation of tobacco smoking to lung cancer by comparing the relative intensity of the smoking habit (cigarettes, cigars, pipe) among the members of a series of 86 lung cancer patients with the intensity distribution among a normal control group (Table I).

According to the occupational data given, there were in the cancer series 19 male individuals occupationally exposed to metal dusts and fumes, lubricating oil mist and soot; 12 exposed to soot and automobile exhaust; 11 exposed to ingredients of paints; one exposed to chromates; while of the 10 female cancer cases, three had worked in an ammunition plant and one in a cigarette factory. A possibly significant occupational exposure history thus existed in 43 of the 76 male cases and in perhaps four of the 10 female cases.

An analysis of the tobacco smoking history of 93 lung cancer patients of Schairer and Schöniger revealed similar statistical correlations, since 29 were highly excessive smokers; 19 very heavy ones; 31 heavy ones; and 11 moderate ones, while three were non-smokers.

While these discussions of a possible causal relation between cigarette smoking and lung cancer first aroused little attention beyond the narrow circle of research workers, the problem started to attract wide attention from the medical profession, public press, industry, and laity after the publication of the papers of Schrek, Baker, Ballard and Dolgoff and of Wynder and Graham in 1950. There followed in rapid succession a number of statistical investigations of this problem from this country and abroad (Levin, Goldstein and Gerhardt; Breslow; Ochsner, DeCamp and DeBakey; Graham; Wynder; Mills and Porter; Dungall; Doll and Hill; Daff and Kennaway; Daff, Doll and Kennaway; Gsell). From the results of these studies the following conclusions were drawn by the different investigators:

WYNDER and GRAHAM: Excessive and prolonged use of tobacco, especially cigarettes, seems to be an important factor in the induction of bronchiogenic carcinoma. Among 605 men with

This is adapted from DR. HUEPER'S monograph entitled "Occupational and Environmental Pulmonary Cancer—With Special Reference to Pneumoconiosis." The monograph, in its complete form as published, will include some 900 bibliographical references.

TABLE I.
DEGREE OF TOBACCO CONSUMPTION AMONG 86 LUNG CANCER CASES AND 86 NORMAL CONTROLS

Degree of Tobacco Consumption	Highly Excessive		Very Heavy		Heavy		Moderate		Non-Smokers	
		No. of Cases		No. of Cases		No. of Cases		No. of Cases		No. of Cases
% of Degrees Among Lung Cancer Series	29	(25)	21	(18)	15	(13)	31	(27)	4	(3)
% of Degrees Among Normal Controls	5	(4)	6	(5)	25	(22)	48	(41)	16	(14)

bronchiogenic carcinoma, other than adenocarcinoma, 96.5% were moderately heavy to chain smokers for many years, compared with 73.7% among the general male hospital population without cancer.

SCHREK *et al.*: The correlation between smoking and cancer is probably not due to fortuitous or secondary factors. It seems plausible, therefore, to formulate the hypothesis that there is a direct relationship between cigarette smoking and cancer of the respiratory tract and that cigarette smoking may be a carcinogenic agent. This relatively low percentage of deaths by cancer of the respiratory tract compared to the high percentage of smokers indicates that smoking is, at most, only a weak carcinogenic agent.

OCHSNER, DECAMP and DEBAKEY: There is a distinct parallelism between the sale of cigarettes and the incidence of bronchogenic carcinoma. Because the carcinogenic effect of cigarette smoking does not beome evident until after many years of smoking (approximately 20), it is frightening to speculate on the possible number of bronchogenic cancers that may develop as the result of the tremendous numbers of cigarettes consumed in the two decades from 1930 to 1950. If there is a causal relationship between cigarette smoking and bronchogenic carcinoma the deaths per 100,000 population from this cause may be expected to increase from 11.3 to 29.4 by 1970.

LEVIN, GOLDSTEIN and GERHARDT: These data support the conclusion that lung cancer occurs approximately 65% more frequently among males who have smoked cigarettes for 25 years or more than among males who have smoked cigars or pipes for a comparable period, or non-smokers. The data indicate also that pipe and cigar smokers have no higher incidence of lung cancer than non-smokers. The findings suggest, although they do not establish, a causal relation between cigarette and pipe smoking and, respectively, lung and lip cancer.

MILLS and PORTER: Among cancers of the respiratory tract from the larynx downward, an abnormally high percentage of cigarette smokers, as well as of pipe and/or cigar users, is found. This group of cancer victims exhibits significantly increased percentages in all forms of smoking.

DOLL and HILL: Among the smokers a relatively high proportion of the patients with carcinoma of the lung fell in the heavier smoking categories. Smoking is a factor, and an important factor, in the production of carcinoma of the lung. The risk of developing carcinoma of the lung increases steadily as the amount smoked increases. If the risk among non-smokers is taken as unity and the resulting ratios in the three age groups in which a large number of patients were interviewed (ages 45-74) are averaged, the relative risks become 6, 19, 26, 49, and 65 when the numbers of cigarettes smoked a day are, 3, 10, 20, 35, and say 60—i.e., the mid-points of each smoking group. Cigarette smoking was more closely related to carcinoma of the lung than pipe smoking. No distinct association was found with inhaling.

TABLE II.
STATISTICAL CORRELATIONS BETWEEN TOBACCO SMOKING AND LUNG CANCER; DEGREE OF SMOKING HABIT AMONG LUNG CANCER PATIENTS (MALES)

Authors	Highly Excessive	Very Heavy	Heavy	Moderate	Non-Smokers	
Schrek, et al.	18.3		50.0	12.2	14.6	Cigarettes, only, balance pipe and cigars
Wynder and Graham	20.3	30.9	35.2	12.4	1.3	
Doll and Hill	5.0	21.0	30.3	38.6	5.1	
Breslow	15.3	50.7	19.5	3.5	9.0	
Gsell	30.0	37.0	21.0	10.5	2.0	
Controls:						
Wynder and Graham	7.6	11.5	35.6	30.5	14.6	
Doll and Hill	2.1	11.4	30.5	47.1	8.8	
Breslow	3.5	34.8	18.8	11.1	30.5	

IT APPEARS from the speculations of Doll and Hill that among the population of Greater London over the age of 45, those who smoke 35 or more cigarettes a day had a chance of developing cancer of the lung which was 50 times greater than that of non-smokers of similar age. Assuming that these conclusions are essentially correct, it may then justly be argued that an effective control of cigarette smoking offers the means for a far-reaching prevention of cancer of the lung and, possibly, the larynx. The statistical data which form the basis of these conclusions are summarized in Table II. Brunner found among 127 lung cancer patients 75% heavy smokers and 9.5% non-smokers.

Sadowsky, Gilliam and Cornfield concluded from their analysis that the magnitude of the relative risk of lung cancer among cigarette smokers was about five times that in non-smokers, that there was a real statistical association between cigarette smoking and laryngeal cancer, and between pipe smoking and cancer of the lip. They leave open the question whether or not smoking is etiologically related to lung cancer.

An even less positive note was recently furnished by the investigations of Denk who found a much smaller percentage of heavy smokers (28.4%) and a comparatively high percentage (41%) of non-smokers and mild smokers among 757 cases of lung cancer for which data on smoking habits were obtained. Denk stated that the American observations concerning a relation between a greater consumption of cigarettes and the likelihood of the development of bronchial carcinoma do not hold true to the same extent in Austria.

Smithers cautioned against advancing extravagant claims on the significance of cigarette smoking in the causation of lung cancer, and pointed to the possible role of urban air pollution as a likely factor.

While some of the not inconsiderable differences in the relative percentage of smokers of various degrees are doubtlessly due to the use of different standards in the classification used, this explanation, however, does not hold for the

proportion of non-smokers listed by the different investigators. The percentage range for non-smokers is from 1.3 to 14.6% for the various lung cancer groups and from 8.8 to 30.5% for the control groups. These discrepancies suggest the existence of differences in the basic composition of the human material evaluated. The validity of this concept also is supported by the fact that the various investigators noted rather widely varying proportions of adenocarcinomas in males and females in their respective series. The histologic type of pulmonary cancer is predominantly of the epidermoid variety among males, while a considerable proportion of these tumors among women are of the adenocarcinomatous kind (36.4% in females; 4.5% in males (Gsell); 52% in females; 18% in males (*Proc. First Nat. Cancer Conf.*); 13.7% in females; 6.7% in males (Mason); 52% in females; 0.6% in males (Wynder and Graham). It was noted also that a history of heavy smoking was less often elicited from patients with adenocarcinoma than in those with epidermoid carcinoma (Gsell; Wynder and Graham).

The apparent lack of uniformity in the human material analyzed by the different authors is further demonstrated by the appreciable differences in the sex distribution of lung cancers reported at different times, from different regions and by different investigators. The male to female sex ratio fluctuates from 2:1 to 20:1 (Hueper). It is noteworthy, however, that the uniformly observed prevalence of lung cancer among males has, in general, become in recent years even more pronounced than in former decades. This observation strongly militates against a predominant causal role of cigarette smoking in the production of lung cancer, because all previous experience in the field of occupational cancer indicates that, given the same type of carcinogenic exposure for both sexes and at the same time an increasing equalization of the intensity of exposure, there occurs a narrowing of the gap in incidence rates of the two sexes and not a widening, which actually exists. This interpretation of the diverging sex-related frequency trends is not fundamentally affected by the statement that the interval between the start of tobacco smoking and the appearance of a lung cancer is between 20 and 40 years (Wynder and Graham; Ochsner, DeCamp and DeBakey; Schrek, Baker and Ballard). Even if women may not have indulged on a large scale in tobacco smoking some 30 years ago, there can be little doubt that the cigarette smoking habit has made during this period much greater strides among women than among men.

The purely statistical approach leading to the assumption of the existence of causal relations between two coincidental events and trends is thus in urgent need of supporting biologic evidence. It is for this reason that the negative statistical correlation between pulmonary cancer frequency and cigarette smoking recently reported by Dungal from Iceland has added relatively little to the basic issues. Dungal pointed out that there were among 1939 autopsies performed during 1939-1948, with 417 cancers of all sites, only 12 pulmonary cancers (2.9% instead of 10 to 20% in the United States and 12% in Switzerland); that tobacco, especially of cigarettes, was not particularly popular in Iceland until 1939; and that tarring of the roads which had extensively been done since 1920, had not exerted any influence on lung cancer frequency.

ATTEMPTS to produce cancers with tobacco tar in experimental animals began many years before even any relation between tobacco smoking and lung cancer was suspected—i.e., at a time when the claims of a causal relationship between cancer and tobacco smoking were still limited to cancers of the lip, tongue, mouth, and larynx (Martin, Friedell and Rosenthal).

1. *Skin Applications of Tobacco Tar:* Macker and Schmincke as well as Helwig, using tobacco tar extracts which they applied to the ears of rabbits and the skin of mice, respectively, produced only ulcers with epithelial proliferations, but not cancers. Similarly negative were experiments of Hoffmann, Schreus and Zurhelle who applied denicotinized tobacco tar for 80 days to the skin of mice; and by Cooper, Lamb, Sanders and Hirst who used the same technique for 23 months and observed a single skin cancer. Roffo and Chikamatsu reported the production of cancroids in the ears of a few rabbits after prolonged painting with tobacco tar. These claims were confirmed by experiments of Lü-Fu-hua, but cancers of rabbits' ears were seen only when he used simultaneously intravenous cholesterol injections as well as painted the other ear with coal tar. These observations of Lü-Fu-hua on cholesterinized and coal tar treated rabbits were successfully repeated by Schürch and Winterstein who in turn failed to produce skin cancers in mice receiving skin application of tobacco tar and various tobacco tar fractions having different boiling points.

Sugiura subsequently succeeded in producing a solitary squamous cell carcinoma in a mouse painted with tobacco tar distilled at a temperature between 500° and 900° C. Tobacco tar distilled between 100° and 500° C proved to be non-carcinogenic for mice when applied to the skin. Both distillates were administered in an oily mixture to the ears of rats and rabbits for 52 to 95 weeks without tumor formation. Flory repeated the application of tobacco tar distillates of different boiling points (130-350° C) (350-700° C) as well as of pipe tobacco tar to the ears of rabbits and obtained in a considerable proportion of the animals, papillomas and carcinomatoid tumors, but not carcinomas. Several squamous cell carcinomas were found in mice after the application of these tars.

2. *Inhalation of Tobacco Tar Fumes:* The first attempts to produce cancer of the lung in experimental animals by the inhalation of tobacco smoke were made by Mertens using mice which were exposed in glass jars to tobacco smoke injected into these vessels. Among the first set of

125 mice, two developed "lung cancer," but in both instances they most likely were of "spontaneous" origin. When this experiment was repeated no lung tumors were obtained. Likewise negative were similar experiments of Lorenz *et al* when mice inhaled tobacco smoke introduced into a closed container. The strain A mice exposed to tobacco fumes showed the same incidence of spontaneous lung tumor as control animals. In Campbell's experiments in which a similar technique of inhaling tobacco smoke was used, there followed a minor increase of lung tumors in the test series over that of the controls.

A more direct and drastic method for introducing tobacco tar into the lungs of experimental animals was chosen by Roffo who injected this material directly into the lungs of rats and obtained in one rat, four small squamous cell carcinomas.

A critical evaluation of the total experimental evidence permits the conclusion that tobacco tar obtained at various distillation ranges is of very weak if not doubtful carcinogenicity to the skin of mice and produces apparently only carcinomatoid tumors in the ears of rabbits, when applied over long periods of time. The inhalation by mice, of tobacco smoke released into the atmosphere, failed to produce lung cancers. The unconfirmed positive claims of Roffo have been disregarded in reaching these conclusions.

3. *Demonstration of Known Carcinogens in Tobacco Smoke and Tar:* Among the known carcinogenic chemicals which may occur in tobacco smoke or tar, carcinogenic aromatic hydrocarbons and arsenicals have to be considered. The carcinogenic aromatic hydrocarbons might be formed during the combustion of the tobacco while arsenicals might occur in only those tobacco tars and fumes which are generated from tobacco containing arsenical insecticide residues.

Although Roffo asserted to have demonstrated 3, 4-benzpyrene in tobacco tar by spectroscopic methods, this claim has remained unconfirmed by several very reliable investigators (Schürch and Winterstein; Cooper, Lamb, Sanders and Hurst; Waller).

While the failure to demonstrate 3, 4-benzpyrene in tobacco tar does not exclude the possible presence of other carcinogenic chemicals in this material, it nevertheless is an observation which is noteworthy because 3, 4-benzpyrene seems to be one of the common carcinogenic combustion products of carbonaceous matter of many kinds.

In view of these negative findings for carcinogenic hydrocarbons in tobacco tar some investigators recently have favored the concept that the alleged carcinogenic effect of tobacco smoke upon the respiratory tract depends at least in part upon the inhalation of arsenic present in the tobacco as an insecticide residue and volatilized during the smoking process (Doll and Hill; Goulden, Kennaway and Urquhart). In fact, rather appreciable amounts of arsenic can be demonstrated in tobacco and in tobacco smoke, especially of the American variety. Gross and Nelson found that the arsenic content of cigarette tobacco of five brands ranged from 9.7 to 36.3 ppm, that of cigars from 8.3 to 48.4 ppm, and that of pipe tobacco from 26.0 to 50.0 ppm. Thomas and Collier noted that the range of the arsenic content of cigarette tobacco was from 35.4 to 114 ppm, while that of cigars was 13.2 to 29.5 and that of pipe tobacco 22.7 to 42.8 ppm. The reason for the marked variations in different samples and various types of tobacco is undetermined. However, different climatic conditions and methods of cultivation and processing of tobacco in various parts of the United States and the different uses to which the various types of tobacco are subsequently put in the production of tobacco goods may have a decided influence in this respect.

In more recent studies of cigarette tobacco by Daff and Nelson, three American brands gave an arsenious oxide content ranging from 25 to 47 micrograms; two English brands had one ranging from 50 to 55 micrograms; eight Turkish brands had one ranging from 0 to 4.1 micrograms; one French brand ranged from 0.5 to 1.5 micrograms; and, from a Rhodesian brand, the range was 1.8 to 4.1 micrograms. Popp found that Palatinate tobacco contained 5.1 ppm of arsenic; Macedonian cigarette tobacco, 0.1; Java tobacco, 0.33; and Brazilian tobacco, 4.6. Oliver reported that English pipe tobacco contained 32 ppm of arsenic (as metal); cigarettes, 68 ppm; Jamaica cigars, 30 ppm; and Havana cigars, 170 ppm.

The observations show that the concentration of arsenic in cigarettes, cigars and pipe tobacco is very variable, depending upon the brand as well as upon the country of origin. The tobacco of American derivation, and smoked in the U.S.A., Canada, Norway and England, has by far the highest arsenic content (24 to 106 micrograms As_2O_3 per gram of tobacco), while tobaccos grown in the eastern European countries and Turkey have, as a rule, a low arsenic content (0.0 to 4.3 micrograms As_2O_3 per gram of tobacco). This type of tobacco is used in cigarettes made in Austria, France, Poland and Bulgaria.

In adjudging the degree of arsenic hazard which may result from the smoking of arsenic-containing tobacco, Daff and Kennaway, Thomas and Collier, and Gross and Nelson ascertained that between 7% and 26% of the arsenic present in the tobacco is volatilized and may be inhaled during the smoking process. Remington, however, placed this portion as high as 50%. Daff and Kennaway expressed the degree of potential hazard by the following calculation: "If a person smokes 50 cigarettes with a mean arsenic content of 50 micrograms and 15% of this escapes, he has volatilized 0.375 mg. As_2O_3, which is the amount contained in 0.0375 cc. of Fowler's solution (official dose 0.125 to 0.5 cc.)."

IN A RECENT, very illuminating study of the relation of cancer of the lung to tobacco as grown and smoked in different countries, Daff, Doll and Kennaway have unearthed important observations which strikingly demonstrate the complexity of the problem, and show "that the arsenic

content of tobacco has not provided any simple and exclusive explanation of the association between cigarette smoking and this form of cancer." Analyzing first the data provided by Saglam, Schwartz and Yenerman from Istanbul, Turkey, where for over five decades tobacco was consumed almost wholly in the form of cigarettes and where there have been many heavy smokers among women, they found that there had been a considerable rise in lung cancer frequency during the past 50 years, according to clinical and anatomic-pathologic statistics (increase in clinical material, 12 times, in pathologic material, 4.1 times). However, the male: female ratio changed from 6:1 during 1935 to 1939 to 8:1 during 1949-1950, although cigarette smoking has been a habit indulged in by Turkish women for many decades. The tobacco consumption expressed in pounds per head increased from 1.21 in 1925 to 1.9 in 1949. Since the tobacco consumption stood in 1935 at only 1.55 lbs. per head, and in view of the long lag period in the development of lung cancer, it is most unlikely that the increase in lung cancer frequency in Istanbul has any relation either to tobacco consumption or to its arsenic content. This view is supported by the sex ratio which is, like in many other countries, markedly and increasingly in favor of males, despite the long established smoking habit among Turkish women. Saglam also, therefore, rejected cigarette smoking as a factor in the incidence of bronchial carcinoma.

Another illustration of the apparent lack of significance of arsenic in tobacco in relation to the causation of lung cancer and its recent increase seems to be provided by the autopsy data from Ljubljana, Yugoslavia, provided by Kosir. During the period 1925 to 1939 lung cancer represented 7% of all males coming to autopsy with cancer of all sites, and 1.5% of all females of the same type, while during 1940 to 1949 these figures stood at 15% and 2%, respectively. Tobacco is smoked principally in cigarettes of oriental type with a low arsenic content. The increase in lung cancer frequency thus was disproportionately large for males.

The data provided to Daff, Doll and Kennaway on Switzerland by v. Meyenburg have been complemented by those recently given by Gsell.

According to Gsell, there has taken place in recent years a marked increase in the consumption of cigarettes (10-fold between 1924 and 1949) but the main tobacco product consumed in Switzerland has remained the "Stumpen," a medium-sized cigar without a tip. There were 48 Stumpen and cigar smokers and only 30 cigarette smokers among Gsell's 87 cases. The absolute number of lung cancer cases rose in males from 68 in 1905-1909 to 2058 in 1945-1949 (20.7 times), while the corresponding increase in female cancer deaths was from 59 cases in 1905-1909 to 421 cases in 1945-1949 (7.1 times). During the same period there occurred a shift of the male:female sex ratio from 2:1 in 1905-1909 to 4.9:1 in 1945-1949. The lung cancer death rate per million stood in 1931 at 66 for males and at 14 for females, while in 1947 it was 183 for males and 34 for females. The arsenic content of tobacco of Swiss cigarettes was of intermediate order (3.1 to 12.0 micrograms of As_2O_3 per gram). Since during the critical period of lung cancer increase for which Swiss tobacco consumption figures are available (1924 to 1935) the main use of tobacco was in the form of cigars, Stumpen and Toscani, one must assume that the majority of the lung cancers observed during the years 1940 to 1949 cannot be attributed to the smoking of cigarettes, if smoking at all had any causal connection with their development. That the existence of such a relation is not likely is again attested by the divergent trends in the sex distribution of lung cancer, which according to past experience on this point from the field of occupational cancer would display a tendency toward equalization whenever members of both sexes are exposed to the same environmental carcinogenic agent. That this principle also applies to tobacco smoking is evident from the recent statistical studies of Doll and Hill who ascertained that the risk of developing cancer of the lung is the same in both men and women, apart from the influence of smoking.

The importance of this argument is strikingly illustrated by the information supplied to Daff, Doll and Kennaway by Kreyberg concerning the lung cancer incidence in Norway during the past 20 years. Apart from the fact that deaths from lung cancer were higher in urban than in rural districts of Norway, there occurred during the two decades a definite rise in pulmonary cancer frequency from about 20 in 1930 to approximately 157 in 1948. The rise was more marked in urban areas than in rural ones, and affected males to a higher degree than females. While thus the Norwegian experience followed in this respect the usual pattern, it differed fundamentally from it in its sex distribution. During the first six years of the survey period, lung cancers were apparently as frequent in females as in males and thereafter the rise of the rates in females fell somewhat below that of males. This observation permits only one interpretation when analyzed in the light of the existing facts: that the epidemiologic behavior of lung cancer as to sex distribution was influenced in Norway by probably environmental factors which were not active at all or to the same degree in the other countries investigated. Since the population of Norway has smoked predominantly American made tobacco, this deviation from the common epidemiologic pattern does not support the view that tobacco smoking in Norway or in any of the other countries was a deciding and important factor in determining lung cancer epidemiology during the past 50 years.

In the various arguments advanced purportedly favoring the cigarette smoking role in the causation and rise of lung cancers much is made of the existing parallelism between the increase of lung cancer frequency and the increased consumption of smoking tobacco, particularly cigarettes, during the last 25 to 50 years. In the graphic pre-

sentation of these two developments the relative events of annual rise of lung cancer rates and of tobacco consumption are invariably synchronized, while in fact these events have a distinct heterochronicity because of the long latent period of lung cancer which has been estimated for smokers to range between 20 and 40 years. The lung cancer cases observed in 1950 for instance, therefore have no causal connection with the tobacco consumption of the same year but more likely, if at all, with that recorded for 1920 to 1935. It is evident from this consideration that the so-called "parallelism" as presented by synchronized graph lines gives a definitely distorted expression of any possible hypothetical relation between lung cancer and tobacconism (Figs. 1, 2, and 3).

DISTINCTLY disconcerting in this respect is also the obvious disagreement of different investigators as to the relative role which cigarette smoking, on the one hand, and the smoking of pipe tobacco and cigars, on the other hand, allegedly play in the causation and rise of lung cancer. While Levin *et al* contended that only cigarette smoking but not pipe and cigar smoking reveals a positive statistical correlation, Mills *et al* emphasized that all three forms of smoking are equally guilty, while Wynder and Graham, Gsell, and, to some degree also, Doll and Hill, assess the individual smoking habit by including all types of smoking. While Doll and Hill contemplated the possibility that pipe smoking may be less lung cancer inducive than cigarette smoking because in their opinion pipe smokers smoke less tobacco than cigarette smokers, it may be well to consider the fact that many cigarette smokers discard their cigarettes after a few puffs and that, therefore, the assessment of the degree of cigarette smoking may more easily become exaggerated, while that of the pipe and cigar smoker may become underestimated. Cage indeed stated that one study strongly indicated that the average cigarette smoker consumes less tobacco per day or year than a cigar smoker or chewer.

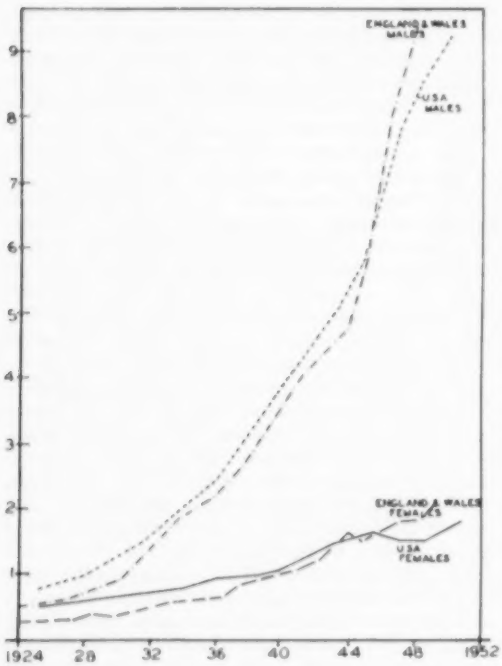

Fig. 1.
Trends in respiratory cancer mortality in England and Wales compared with similar trends in the U.S.A., 1924-1950.

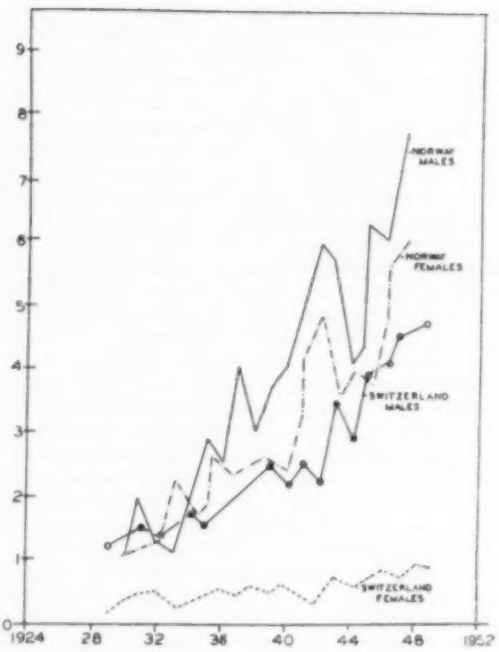

Fig. 2.
Comparative trends in respiratory cancer mortality in Norway and Switzerland, 1924-1950.

Of undoubted importance seems to be another statement of Doll and Hill in which they note that inhaling of cigarette smoke did not convey any increased lung cancer liability. This is an observation which cannot be reconciled with facts established for determining occupational cancer incidence. Whenever the intensity and duration of exposure to an occupational carcinogen increases, there rises the cancer incidence rate among the exposed population group. There is no plausible reason to assume that the inhalation of allegedly carcinogenic tobacco smoke would be exempted from this rule. The complete lack of even minor increase of laryngeal cancer during the past five decades, although the larynx forms a part of the smoke tract, also militates against the tobacco smoking survey of lung cancer.

There appears to be also an inconsistency in the argument that the lack of a positive statistical relation of pipe and cigar smoking to lung cancer noted by several investigators might be due to

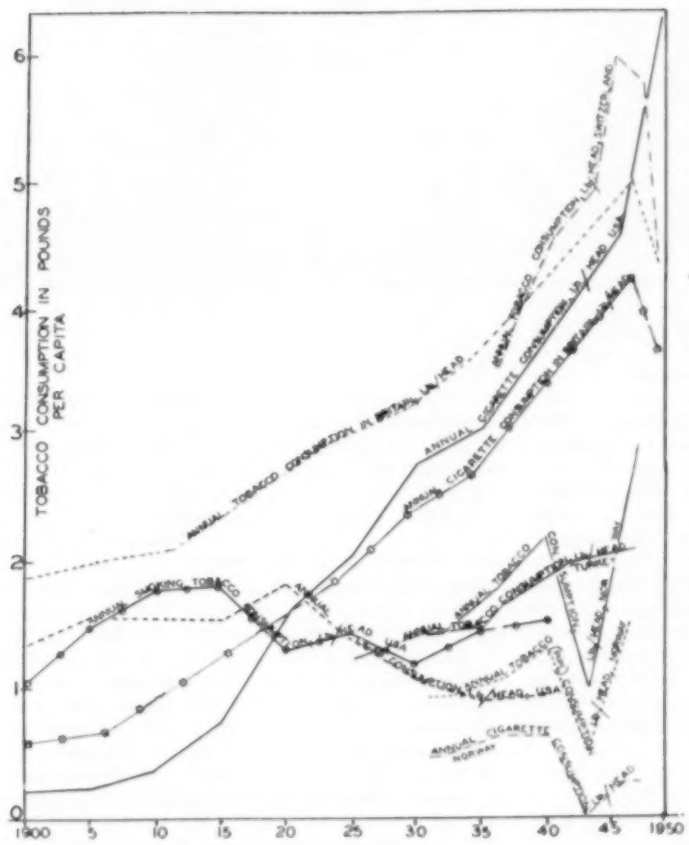

Fig. 3.
Tobacco consumption per capita in pounds.

the fact that the carcinogenic material present in the smoke may have been reduced by filtration or condensation in the pipe stem or cigar, since these two types of smoking show a positive association to cancer of the lip and/or mouth. If indeed the smoking of cigarettes represents a more powerful respiratory cancer hazard than that of pipes and cigars, as asserted, one should expect that such an action should also be reflected in an excessive liability to cancer of the lip and mouth in cigarette smokers because these parts of the smoke tract have obviously the first and thus most intense contact with the still hot cigarette smoke and for this reason should react to the same, if not higher, degree than in pipe and cigar smokers, with cancers of the oral cavity. The statistical evidence, however, shows that a reverse statistical relation is observed.

One may develop, moreover, some doubts as to the medical validity of the statistical data advanced in support of the cigarette theory, if one contemplates the fact that Doll did not find a positive association of respiratory irritative symptoms for individuals with cancer of the lung, although the prevalence of a chronic cough, i.e., "the cigarette cough," is a well recognized clinical manifestation in chain smokers.

In clinically evaluating the claims made in regard to the predominant origin of lung cancer from excessive cigarette smoking, it may be well to remember that the start in the rise in lung cancer incidence occurred around the turn of the century and therefore preceded by about two decades the widespread adoption of the cigarette smoking habit. This fact deserves serious consideration because various investigators have given a latent period of 20 to 40 years for cigarette cancer of the lung.

The existence of consistently and markedly higher incidence rates of lung cancer for populations residing in industrialized and urbanized regions in comparison to those found for rural populations by English, Danish, German and American investigators, as well as of considerable variations in lung cancer morbidity rates established by recent studies of American workers for population groups of similar environmental background (metropolitan areas of 10 American cities), must deepen the suspicion that other and apparently more important environmental factors than cigarette smoking are causally related to the causation of lung cancer and its alarming rise in incidence.

IT MAY be concluded that the existing evidence neither proves nor strongly indicates that tobacco smoking, and especially cigarette smoking, represents a major or even predominating causal factor in the production of cancers of the respiratory tract and are the main reason for the phenomenal increase of pulmonary tumors during recent decades. If excessive smoking actually plays a role in the production of lung cancer, it seems to be a minor one if judged from the evidence on hand. However, it may be well to remember in this connection, the concluding statement of Doll and Kennaway, that "the study of the relation between the national consumption of tobacco and the national incidence of cancer of the lung has scarcely begun."

Industrial Hygiene Foundation

Eighteenth Annual Meeting—November 18-19, 1953

IT IS barely possible that the Industrial Hygiene Foundation is in league with vendors of black magic. So it might appear, since during Dr. Philip Drinker's presentation on the final assessment of the physiologic significance of the London smog of December, 1952, dramatically word came in over the radio and the daily press that then and there London was undergoing a 1953 episode of devastating smog.

The key topic of the Eighteenth Annual Conference was human relations. Annually management, at least to the extent of the Industrial Hygiene Foundation's membership representing management, undergoes orientation at the hands of attorneys, physicians, industrial hygienists, and compensation officials. In the process there comes about a great deal of orientation among the physicians themselves, the hygienists, the attorneys, and all the other groups there present.

The flavor of many of the outstanding addresses may be epitomized in one or two sentences, sometimes pure quotation. An attempt is made to portray the whole through this instrument of epitomization.

The Medical Conference

DR. C. M. PETERSON—"The Proper Scope of Medical Care in Industry": Various state medical societies are attempting to devise codes of ethics pertaining to industrial medical practice. The American Medical Association, through its Council on Industrial Health, is seeking to forestall any highly diversified codes by the preparation of "guiding priciples" for the practice of industrial medicine.

DR. W. P. SHEPARD—"The Stress Disorders": More stress is likely to arise from not working than from working. Hard physical work in industry probably never killed any workman, but much stress does arise from mental and emotional maladjustments in industry, much of which is subject to amelioration.

DR. C. E. DUTCHESS—"Problems Associated with Older Workers": Every year 425,000 industrial workers reach the age 65. Their problems, except as to work itself, are much the same as for the equally aged in the total population. There is sincere doubt that retirement on an age basis at 65 is the best solution to the older worker's difficulties.

DR. C. D. SELBY—"Compensation for Residual Disability": An industrial injury is never an event to be associated with financial profit. The best expenditure of compensation funds is to be found in rehabilitation, with the objective being restoration to gainful employment.

Joint Medical-Legal Conference

THE PANEL participants were E. T. Andrews, H. D. Sayer, H. F. Dimond, Hon. Mary Donlon, Dr. J. P. Hughes, Dr. O. A. Sander, with T. C. Water as Moderator. This was a question and answer session. Some 40 questions were prepared, not all of which reached the panel. A typical question was: "What steps should be taken to secure general cooperation among compensation attorneys, industrial physicians and commissions to eliminate the racketeering lawyer and the unethical medical witness?" As expectable, there was no shouting unanimity in answer to any question. It now appears that no question merely has two sides. It may have six or eight.

General Meeting

SERVING as host, Dr. E. R. Weidlein, President of the Mellon Institute—Pittsburgh, after years of groping beneath a blanket of fog and smoke, now possesses an atmosphere not quite of mountain-top purity yet so much better that neither the denizens of Pittsburgh nor the casual visitor scarcely recognize the city with 67% more sunshine. This has been accomplished foremostly through education, but with a judicious quantity of legislation. Every house-holder has been made a contributor to the now visible Pittsburgh. Every other smoke ridden city can do as much, although it is a mite expensive initially but not in operation.

MR. ANDREW FLETCHER—"The Industrial Hygiene Foundation": During its first 17 years, the Foundation was never in the doldrums but here in its eighteenth year the Foundation finds itself with a modest excess of receipts over expenditures—$10,000 to be exact. The objectives of the Foundation are such that

Left to right, Andrew Fletcher, Vincent P. Ahearn, Dr. E. V. Murphree, Dr. C. Richard Walmer, and Dr. Edward R. Weidlein.

Left to right, Dr. Kenneth W. Smith, Dr. Edward H. Carleton, Dr. W. P. Shepard, Dr. C. M. Peterson, Dr. C. E. Dutchess, Dr. Carey P. McCord, and Dr. O. A. Sander.

never is the accumulation of profits a desideratum.

MR. V. P. AHEARN—"The Role of Government in the Employer-Employee Relationship": Surely there must be some better way in employer-employee disaffections than to call in governmental agencies at every turn. Maturity on the part of management must be matched by an equal maturity on the part of labor leaders. Never overlook the fact that the patience of a tolerant public can be exhausted.

MR. HENRY D. SAYER—"Industrial Noise: A National Problem": It was indicated that a few court decisions have been made referable to compensation for those made hard of hearing or deafened on the assumption of damage from noise at work and not always with regard to wage loss. Unless a larger body of knowledge is attained through research, and unless compensation bodies are governed by rational appraisal of the situation, the dangers involved are so high in potential expenditures of dollars as to constitute a threat to the very existence of industry.

MRS. ELIZABETH WHITNEY—"Socio-Economic Aspects of Alcoholism": "History shows that human beings avoid complex problems until it becomes easier to solve them than tolerate them." Alcoholism has reached that stage. Alcoholism is solvable.

Human Relations in the Industries

MR. E. O. MOHN—"Labor": "We are opposed to having 'human relations specialists' move into the industrial picture who try to manipulate our opinions or attitudes or loyalties, who may try to set up systems of 'non-monetary rewards' to secure higher production without comparable financial compensation, or who feel that by building up the 'morale' of a work group, they can undermine the loyalty of workers to their unions."

REAR ADMIRAL F. J. BELL (ret.)—"Management": "A leader is a man who never has to look behind him to know that he is being followed."

DR. G. W. WEBER—"Extramural Activities": "All that Christ saw from the cross on Calvary was people." Three and four-tenths percent of people are likely to vote against anything.

DR. H. S. KALTENBORN—"Research": "All would, I believe, agree that if research in the area of human relations is to be better understood and of more immediate use, some way must be found to relate the research and research findings in a meaningful logical way which can be effectively reflected in the *practice* of human relations in industry."

While these somewhat general sessions were in progress, the more precisely technical minds assembled themselves in near-cloistered groups. One session dealt with the analysis of biological materials, etc., such as, for example, "insecticides," and in another session such topics as "Dust Control Developments in Asbestos Screening Operation and Jute Bag Storage."

SUCH was the flavor of the Eighteenth Annual Congress of the Industrial Hygiene Foundation. That flavor was agreeable to the mind, but not without mental provocation to the point of mental disturbance—all prophetic of creative responses. There was yet another agreeableness. The hosts of "two parties" well after the labors of the day, carefully shielded by name on the printed program, made their own contribution. Grateful participants attest to the abundance of the entertainment. During the daylight hours the double domes captivated the 800 in attendance, but at twilight another world—the world of sociability took over.

Left to right, Rear Admiral F. J. Bell (ret.), Dr. G. W. Weber, Dr. E. V. Murphree, Dr. H. S. Kaltenborn, and E. O. Mohn.

Problems Related to Injuries of the Knee

GUY A. CALDWELL, M.D., New Orleans, Louisiana

AFTER 20 years of active orthopedic practice, during which knee injuries have been frequently encountered, I have been impressed more and more by my own mistakes and those of others relating to failure to diagnose rupture of the supporting ligaments with or without associated tears of the meniscus. These errors in diagnosis with the unfortunate consequences of recurrent periods of pain, swelling and disability, have been emphasized by Smillie[1] and others, but still occur all too frequently.

The clinical picture of the neglected or mismanaged case of ruptured ligaments, familiar to all, was well portrayed by Smillie when he wrote, "Following an injury which resulted in considerable swelling of the joint, the patient was confined to bed for a matter of two or three weeks. No exercises were practised. At the end of this time, the swelling had completely subsided, but on resuming weight-bearing, the effusion immediately reappeared. The limb was then encased in plaster for a period of six weeks. No exercises were practised. At the termination of this further period of immobilization the swelling had again subsided, but reappeared within a short time of resuming weight-bearing. Many weeks have now passed without improvement. Every possible cause of effusion has been suspected, and many laboratory investigations have been performed with negative results. The present complaint is that of swelling, weakness, and instability.

"Examination reveals effusion, with palpable thickening of the synovial membrane of the suprapatellar pouch, gross wasting of the quadriceps, and 'relaxation' of all the accessory supporting structures of the joint.

"This is the picture of a chronic traumatic synovitis which at best will take many months to cure; at worst it is the initial stage of a traumatic osteoarthritis which will inevitably progress."

Review of my own errors and those of others in the management of seemingly minor injuries or sprains of the knee (excluding fractures) has shown that most of our poor results have been caused by failure to (1) obtain important facts relative to the mechanism of injury and the immediate effects, (2) elicit signs of instability, (3) appreciate the significance of post-traumatic effusions, (4) aspirate the joint and examine the fluid obtained, (5) initiate and follow through with quadriceps exercises, and (6) defer full weight-bearing long enough to permit complete healing of the articular structures.

Presented at a meeting of the Association of Surgeons of the Southern Railway, Birmingham, Alabama, May 1, 1953.

Mechanism of Injury

WE KNOW that partial or complete rupture of the internal collateral and anterior cruciate ligaments is usually produced by forcible torsion and abduction of the partially flexed knee. An example is the football player who receives a blow on the outer side of the knee when it is slightly flexed and inwardly rotated. It is the same mechanism which tends to produce a tear of the internal meniscus. The anterior cruciate may also be ruptured by hyperextension by forcing the femur backwards when the knee is flexed with the tibia fixed, or by violent rotation.

Although it is not always possible for a patient to recall the pertinent details connected with his injury, it is important to record as much information as possible about his exact position at the time of the injury and the direction of the blow that produced it. Likewise it is helpful to know where he felt the most pain at the moment of impact, and whether he was able to straighten his knee completely, and to stand and bear weight upon it immediately afterwards. The rapidity with which swelling appeared and where the maximum swelling and tenderness were first noted often suggest the correct diagnosis because rapid distention of the articular cavity within 20 or 30 minutes accompanied by severe pain probably indicates rupture of one or more ligaments with hemorrhage into the joint, whereas the more gradual development of localized swelling and tenderness over the inner condyle of the femur with moderate, slowly developing effusion in the joint, suggests a sprain or partial tear of the internal collateral ligament.

Signs of Instability

LATERAL instability of the knee may be demonstrated by first fully extending the joint and then alternately abducting the leg on the femur. To demonstrate anteroposterior instability the patient should be seated with his foot resting on the floor and his muscles relaxed; the examiner then grasps the upper portion of the tibia and alternately pushes and pulls it back and forth beneath the condyles of the femur. These tests can be readily carried out on a knee that is not swollen and painful but can seldom be performed on the recently injured knee, particularly if it is distended with effusion. Nevertheless, it is so

important to obtain evidence concerning the stability of a recently injured knee that it is justifiable to aspirate the fluid from the knee and inject a few cubic centimeters of a 1% solution of procaine hydrochloride, to infiltrate the tender areas with procaine, or even administer a general anesthetic if necessary in order to complete the examination. Definite lateral or anteroposterior instability is proof of complete ligamentous tear, in which case the surgeon must consider the advisability of operative repair or immobilization in plaster to permit firm healing, a matter of 10 or 12 weeks, as contrasted with application of a simple pressure bandage and moderately restricted activity for a simple sprain with traumatic synovitis.

Post-Traumatic Effusions

WATER on the knee," the layman's expression commonly applied to articular effusion occurring after injury, may be the result of relatively mild trauma to the synovial membrane and the supporting ligaments of the knee. However, one cannot determine by inspection and palpation alone whether such an effusion is simply excessive production of synovial fluid or a hemarthrosis. The latter signifies rupture of blood vessels either by a tear of the synovial membrane, a rupture of one or more ligaments, or even a fracture intersecting the joint. If the effusion consists largely of blood, regardless of its origin, it should be removed because it is but slowly absorbed and while it remains in the joint it produces reactionary changes in the synovial membrane. Also fibrin may be precipitated and organized to form adhesions. Furthermore, so long as the capsule and synovial lining are tightly distended, the pressure from within collapses the blood vessels and lymphatics, so that absorption of the excess fluid is prevented.

Aspiration of the Knee Joint

FROM the foregoing it becomes obvious that aspiration of articular effusions is indicated to aid in making a diagnosis, to relieve pain, and to hasten absorption and repair. Although definitely indicated, this procedure should never be lightly undertaken or carelessly performed because of the possibility of introducing infection. Every precaution should be observed as to asepsis, and the skin and capsule should be infiltrated with procaine to make the procedure as painless as possible.

Extensive laboratory examinations and analysis of the fluid obtained from a recently injured knee are seldom necessary. Bloody or blood-tinged synovial fluid is readily distinguished from clear or slightly turbid, straw-colored synovial fluid. Some of the fluid should be examined for fat droplets, which would suggest a fracture.

Quadriceps Exercises

STABILITY of the knee under average use depends almost as much upon the strength of the muscles that move it as upon the integrity of the ligaments supporting it. Moreover, experience has taught that strengthening the thigh musculature, particularly the quadriceps mechanism, will, to a great extent, compensate for loss of some of the ligamentous support. It is also true that the muscular support rapidly atrophies and weakens with disuse, resulting in relaxation and instability of the knee which in turn causes weakness, pain and swelling—a symptom complex often hard to differentiate from that produced by internal derangements of the joint. Therefore, it is of utmost importance that the strength of the supporting muscles be maintained while repair of a knee injury or operation is under way.

It is essential to institute a suitable regimen of exercises for the quadriceps muscles immediately after injury or operation. These can be adapted to the use of such splints and plaster fixations as may be required to protect the ligaments and should be faithfully performed by the patient every hour. As soon as practicable, weight-bearing *with support* should be permitted. The program of exercises should include leg raising with weights attached; there should be progressive increase in the weights attached to the leg as well as the number of times they are lifted, together with gradual increase in the amount of walking. Controlled exercises and activity should be enforced until the thigh musculature has developed to the same degree as that of the normal leg, which usually requires three to six months.

Full Weight-Bearing

REPAIR of supporting ligaments of the knee is obviously influenced by articular motion and by the stress of weight-bearing. Either tends to stretch or tear the granulations and early formed fibrous tissue, producing added injury and tending to lengthen the supporting ligament. Therefore, it is essential to prevent motion by splinting and avoid weight-bearing without support until repair is complete. Nevertheless, since the stability of the knee is also dependent upon retaining full strength of the muscles (and these must be exercised in order to retain their strength), a regimen of exercise must be devised that can be performed with the protective splint in place. Such a regimen is possible and practical, but considerable experience and judgment must be used in its application. No fixed schedule is applicable to all cases because the amount of activity prescribed for each must be governed by the presence or absence of swelling and effusion after each day's activities.

Management of the Recently Injured Knee

IN VIEW of the foregoing review of the principles of treatment for ligamentous injuries of the knee, what should be our approach to the care of the recently injured knee? It is first necessary to establish roentgenographically that there is no fracture. Then, by taking a detailed history and making a thorough examination, including aspiration of the knee, with the aid of a local or general anesthetic if necessary, we should be able to classify the injury as (1) simple sprain of the

knee joint, (2) torn meniscus, (3) partial rupture of the internal collateral ligament, or (4) complete rupture of the internal collateral ligament, internal collateral and anterior cruciate ligaments or internal collateral, anterior cruciate ligament and torn meniscus. Treatment must then be selected, depending upon the severity of the injury. However, in the treatment of the mild as well as the severe injury primary consideration must be given to maintaining full strength of the quadriceps mechanism throughout convalescence.

Treatment of the sprained knee consists of aspiration and application of a compression bandage, with bed rest preferably but use of crutches as a second choice, quadriceps exercises and straight leg raising hourly, progressive increase of weight resistance, and weight-bearing and pulley-weight exercises after pain and swelling have subsided. Such measures should be employed for two or three weeks or until full strength of the quadriceps has been regained.

Treatment of the torn meniscus (initial injury) includes aspiration, and manipulation if displaced and the knee is locked, application of compression bandage, bed rest and performance of quadriceps exercises until swelling subsides, application of long leg plaster, gradual resumption of weight-bearing and continuance of quadriceps exercises for three to four weeks, and removal of plaster, full weight-bearing, active knee flexion and pulling-weight exercises until full strength is recovered.

The general plan for *conservative treatment of ruptured ligaments of the knee* is as follows:

1. Aspiration of the joint followed by application of a compression bandage.
2. Application of a posterior molded plaster splint from the toes to the groin.
3. Daily inspection of joint swelling and reapplication of dressing or splint.
4. Aspiration of the joint if effusion reaccumulates.
5. Beginning quadriceps setting and straight leg raising exercises on the second or third day, provided swelling and effusion are subsiding.
6. Gradual increase in the number of times the leg is raised each hour and progressive loading of the leg with two-, four- and six-pound weights, if daily inspection reveals no joint reaction.
7. Application of a long-leg walking plaster cast after 10 to 14 days when the swelling has subsided and continuation of the hourly quadriceps exercises and straight leg raising in bed.
8. About three weeks after injury gradual resumption of weight-bearing, beginning with use of crutches, and continuation of bed or table exercises with progressive increase in the amount of weight lifted.
9. Removal of plaster cast at the end of 12 weeks and performance of active knee flexion exercises combined with the quadriceps exercises and weight resistance for three to six months.

The conservative treatment of partial or complete rupture of ligaments is the same as the plan for conservative treatment, previously described.

Operative repair of *complete rupture* of the ligaments is gaining favor in the hands of surgeons with wide experience in performing knee surgery, and more good results have been reported by O'Donoghue,[2] Palmer,[3] Blair,[4] and others, than have been previously obtained by conservative treatment. However, reasonably useful knees with good function can usually be obtained by conservative treatment provided all the details of treatment are faithfully carried out.

Summary

ERRORS in the diagnosis of rupture of the supporting ligaments of the knee with or without associated tears of the meniscus have been commonly made in the past in cases of knee injuries and have resulted in recurrence of pain, swelling, and disability. Such errors have been due to failure to determine the mechanism of injury, elicit signs of instability, appreciate the significance of post-traumatic effusion, aspirate the joint and examine the fluid obtained, institute a program of quadriceps exercises, and defer full weight-bearing long enough to permit complete healing of the articular structures. Management of the recently injured knee should therefore include (1) roentgenographic establishment of absence of fracture, (2) detailed history, (3) thorough examination, including aspiration, of the knee, (4) classification of the injury, and (5) treatment based on severity of the injury. The importance of maintaining full strength of the quadriceps mechanism throughout convalescence cannot be too strongly emphasized.

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"The Unnecessarily Arbitrary Manner . . ."

THE physician who is new in industrial medicine finds that his decisions, if they are to be respected as well as observed, must be based upon certain practical considerations in addition to exclusively medical ones. The physician may be accustomed to making pronouncements on health matters without explanation, but if he wishes to lay the foundations of a sound working relationship in the plant, he will avoid in his actions the unnecessarily arbitrary manner that may be accepted but is always resented.

—From, "Industrial Medical Service by Private Practitioners," by JAMES P. HUGHES, M.D., Kettering Laboratory, University of Cincinnati, College of Medicine, in *J.A.M.A.*, December 19, 1953.

Expert and Technical Testimony

University of Michigan Conference

THE Institute of Industrial Health and the School of Public Health at the University of Michigan, on October 21, 1953, sponsored a Conference for physicians, attorneys, and industrial hygienists on "Expert and Technical Testimony."

At the planning stage of this Conference, the enterprise was regarded as unlikely to attract any wide concern or any large audience. To the contrary, at the time of the Conference an overflow crowd flatteringly exceeded all facilities. It becomes strikingly apparent that here is a topic of outstanding appeal to both physicians and attorneys, and thus it invites consideration in future planning of scientific programs by medical and legal organizations.

What Is an Expert?

THE following, by Raymond Scallen (*Minnesota Medicine*, October, 1953), is an excellent definition:

"An expert is a person of superior experience, knowledge or skill in any science, art, trade or business. The opinions of witnesses possessing peculiar skill are admissible whenever the subject of inquiry is such that inexperienced persons are unlikely to prove capable of forming a correct judgment without such assistance. The doctor's place in modern litigation is therefore of great importance. The marked increase in litigation involving injuries and death arising out of industry and the operation of motor vehicles has brought medical witnesses almost daily into our courts. The doctor's presence in the courts is not so much a matter of choice as of necessity. It may well be essential to the administration of justice. Certainly in the defense of a malpractice case, for instance, it is of the highest importance to the defendant that members of his profession stand willing to put aside their work for a period of time so that he may have a proper defense. In any event, the medical witness's place in modern litigation is of high importance to the profession because, when the doctor enters the courtroom, he becomes a public relations envoy for good, evil or indifference so far as his profession is concerned. He ought, then, to measure up to the highest standards of a noble profession. The seeds of paternalistic, governmental control can be sown far more often in the courtroom than most people realize when these standards are not maintained; nor is the profession helped by the individual who disdainfully holds himself aloof with ill-concealed contempt for the courts and their procedures. It is obvious that if the best minds of the profession should adopt this attitude, then our judges and juries would never hear the outstanding member of the profession. Fortunately this is not true, and in a proper case some of the great leaders of the medical profession with real modesty and humility appear in court and make a substantial contribution not only to the knowledge of the judge and the jurors with respect to the medical points in question, but also by impressing upon these good people the alertness and indefatigable industry of the medical profession."

Knowing that adherence to these high concepts not always is reached in the courtroom by physicians and those in the allied professions of industrial hygiene, chemistry, toxicology, sanitary engineering, and industrial nursing, this Conference on Expert and Technical Testimony was undertaken. At all times there was but a single objective—elevation of the quality of technical testimony, particularly that of the physician, and better to acquaint him with court procedures in order that his services to the court fully may reflect credit upon his profession.

Outstanding in the Conference were the following presentations and their authors:

MR. BUELL A. DOELLE—"Attorneys, Technical Witnesses, and The Courts" (The Keynote Address).

DR. EDWARD D. SPALDING—"The Physician's Obligation to the Courts."

MR. T. DONALD WADE—"Preparation of the Technical Witness Prior to Court Appearance."

DR. THEO. J. CURPHEY—"The Medical Preparation of a Medical-Legal Case."

DR. ELI SHERMAN JONES—"The Use of Scientific Records and Exhibits in the Court Room."

Good and Poor Technical Testimony

THE evening session of the Conference was devoted to a demonstration (not a mock trial) of the desirous *versus* the undesirable qualities, statements, behavior and mannerisms of good and poor witnesses as presented didactically during the two sessions of the day. A scenario earlier had been prepared, based upon advance copies of the several speakers' manuscripts. This assembled all of the "don'ts" of poor testimony; and ably these were demonstrated after suitable rehearsals by PROFESSOR WARREN A. COOK, simulating the "poor witness" in an imaginary law suit predicated upon a claim alleging silicosis. Correspondingly all of the "do's" characterizing the "good" technical witness were demonstrated by DR. CLIFFORD H. KEENE, a truly qualified technical witness. The demonstration was directed by JUDGE JOSEPH A. CRAIGEN, with the cooperation of highly skilled attorneys, EDMOND F. DeVINE and ROY L. STEINHEIMER, JR., respectively representing the plaintiff and the defendant. After the demonstration, PROFESSOR CHARLES W. JOINER provided a commentary, along with the audience,

on the merits and demerits of the demonstration.

Although this concluding portion of the Conference may have been the most illuminating part of the day's program, obviously this may not be reduced to manuscript form, since a full measure of the actors' presentation resided not in words, but in behavior, gestures, emotional outbursts, and attitudes.

Manuscripts from the entire program are in the process of publication and will be available through the School of Public Health at the University of Michigan. T. DONALD WADE'S "Preparation of the Technical Witness Prior to Court Appearance" has been published (*Indust. Med. & Surg.*, 22:11, 529 (November) 1953).

While the unexpected display of interest in the need for the techniques of expert testimony may impose upon the University of Michigan groups to repeat this program, it appears that many other medical and legal organizations on a nation-wide basis may do well to make available to those concerned similar presentations.

Distressing Emphasis

DR. EDWARD D. SPALDING, whose contribution to this Conference was entitled "The Physician's Obligation to the Courts," "Detroit's distinguished cardiologist, consultant to industry, and sponsor of good industrial medicine," had his office in the Professional Building, Detroit. The Conference to which he lent his wisdom and experience was held on October 21. Six weeks later, almost to the day, at 5:40 P.M., on Monday, November 30, he was leaving his office and had reached the entrance to the building when a kill-crazy former mental patient walked up behind him and shot him at point blank range. He died on the sidewalk. The killer did not know his victim. He said he intended to shoot another doctor. The killer's record showed that some years ago he had been confined in a mental hospital. Thus is the need for competent medical experts distressingly emphasized. . . .

What kind of "expert" judgment was it that let this killer out?

In Our Plants, Our Stores, Our Offices

LET'S TAKE a look at the kind of people who are working for us. It is estimated that there are one million morons in industry today. This may seem as though I were stretching things a bit, for we have misused the term "moron" in recent years. Actually the word "moron" comes from the Greek meaning "dull" or "sluggish." Morons have an intelligence quotient of 50 to 70, not quite half that of the average person of their age. They are adults whose mental age is between seven and 12 years. Do not misunderstand me. A moron can be and often is a good citizen, a loyal worker, a good father and neighbor, a good church member. But his limit of comprehension and understanding must be recognized. He cannot go beyond a certain point in the demands you make on him. The Army tested the intelligence of some 10 million men during World War II. They did not come right out and call it an intelligence test. It was strategically called the Army General Classification Test (A.G.C.T.), but a rose by any name still smells like a rose. A soldier, instead of being said to be of low intelligence was said to be in Classification V. This avoided criticism from taxpayers, since everyone in a democracy is supposed to be equal. Everybody is equal politically, but not equal in size, strength, health, abilities, or powers. Some of those rejected because they fell in Classification V are still working in your plants. Another group was also rejected by the Army, but not because of low intelligence. Of this group, about 30 to 40% were dismissed because they were emotionally unfit. They all came back into civilian life before the end of the war and most of them went to work. They are working in your plants, in your stores, in your offices—the unstable, the neurotic, the potential psychopath. Approximately one out of every 20 people, 5% of our population, belong in an institution for mental disorders, but they are not there. Some of them are working for you. More than half the beds in hospitals in this country are occupied by mental patients. At least 50% of patients who come to doctors are suffering from mental or emotional illnesses, even though they complain of physical aches and pains. Is it not strange? You go to your doctor once a year; you visit your dentist twice a year; how often have you seen a psychiatrist? Does this sound silly? You take good care of the tires and headlights of your car but ignore the motor. Maybe mental health isn't important to us in industry, but it is estimated that if our mental illnesses increase at the same rate we have witnessed during the past 30 years, by 2025 A.D. every last one of us will be in a mental institution. In the October 12, 1953, issue of *Time*, Dr. William Menninger pleaded with industry not only to provide first aid stations for physical ills, but also to provide the same service for emotional ills. He pointed out that 70% of the people who have to be fired are dismissed because of their social incompetence, not because of their technical incompetence. And yet most of them can be helped, if industry has the patience and the willingness to do so.

—From "Problems of Human Relations in the Industries—As Influenced by Extramural Activities," by DR. G. W. WERNER; presented at the Eighteenth Annual Meeting, Industrial Hygiene Foundation, Pittsburgh, November 18, 1953.

Lead and Lead Poisoning in Early America

—THE LEAD PIPE PERIOD—

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This is the fourth of a series of nine items, the totality of which constitutes a substantial history of lead and lead poisoning in early America. The remaining items will appear in consecutive issues of this Journal. DR. MCCORD *is Consultant, Institute of Industrial Health, University of Michigan, Ann Arbor.*

A MISCHIEVOUS HOAX, often republished, has led many thousands of Americans to believe that the first bathtub with running water in the United States, and possibly in the entire world, was installed in Cincinnati in 1842 in the home of a certain Adam Thompson. An embellishment of this story is that President Tyler, visiting Cincinnati, was privileged to view this marvel and by some is credited with having made use of it. Somewhat typical of the endless accounts of this bathtub is one extracted from the *Literary Digest* for September 3, 1932:

"As related in 'An Outline History of Tubbing,' the first bathtub to be built and used in the Republic was perpetrated by one Adam Thompson of Cincinnati in the year 1842. The word 'perpetrated' is used advisedly as it was considered a serious misdemeanor, if not a high crime—might lead to 'phthisis,' rheumatic fevers, a whole category of systemic diseases. The Common Court of Philadelphia tried to pass a measure making bathing illegal between November 1 and March 15. Virginia laid a tax of $30 on tubs. Boston went whole hog, making bathing unlawful save by advice of a doctor. This was repealed in 1862. President Fillmore braved shafts of ridicule in 1851—he had a bathtub installed in the White House. Report says that this action so far destroyed the prejudice that by 1860 every hotel in New York had a tub. Mr. Thompson's tub was of mahogany, lined with sheet lead."

That all of this was a hoax is attested in "The History of the Plumbing Industry in the United States" (Maynard and Beckman, 1941) in this language:

"It has been definitely established that this was the creation of H. L. Mencken, who wrote an article for the *New York Evening Mail*, published on December 28, 1917, which contained these fictitious items. It was intended as a hoax and a piece of humbug to relieve the gloom of the war days. After that time Mr. Mencken made several attempts to kill his fictitious character Adam Thompson, the alleged first United States bathtub owner, but to no avail. Historians insist on citing these so-called facts as the gospel truth."

That sprightly long-lived pleasantry piqued Cincinnati's pride, but even if the installation had been made it would merit no position as any "first." Precedents may have abounded some 3000 years earlier when Eastern Mediterraneans went about bathing in water brought to tubs in trough lead or tile conduits and drained in the same manner. Since that remote period is little identified with present purposes it may be dismissed after a pertinent quotation from Pulsifer:

"Leaden pipes for conveying water were commonly used in early times. They have been found in the ruins of cities in Asia, in Egypt, and in Greece, at Herculaneum, and Pompeii. Sometimes pipes for this purpose were made of copper, stone, earthenware, wood, and even of leather, but lead was principally employed. Vitruvius says that the action of lead is deleterious, and that to secure wholesome water it should be brought through earthen pipes. He refers to the pallid color of the men who work in the lead-works, and says that the fumes from the molten lead destroy the vigor of the blood. The ancients well understood the poisonous nature of lead, their writers frequently refer to it. Pausanias says that in the neighborhood of Puteoli there are hot springs, the water of which in a few years destroys the lead pipes through which it runs. The water was probably contaminated with hydrogen sulphide. Notwithstanding this knowledge of the deleterious effects of lead upon water the ancient Greeks and Romans used kettles, buckets, and other domestic utensils made of it."

In terms of development of the art, it would have been possible for the earliest pioneers in America to have brought with them sheet lead out of which pipes or troughs might have been fashioned for water transport. This becomes possible from the knowledge that the Plumbers Company of London, a worker organization, was formally incorporated on April 12, 1611. Nor was that the earliest mention since the term "plumber" appears in a memorandum of the cost of a new font at East Deereham, Norfolk, dated 1468. There was found the following item: "Paid William, the plumber, for leading the new font, 2s 6d."

Those early pioneers in America did nothing of the sort. Nor might it have been expected that

they would have, or should have. Not for more than a hundred years after the first arrivals is there any known mention of lead water piping, lead gutters, downspouts, flashing, or lead-lined cisterns. Decades later, all such contrivances were commonplace so that by the time of the war between the States ancient houses were deprived of their leaden fixtures but chiefly gutters and downspouts in order to provide lead bullets for Mr. Lincoln's armies, since the most productive lead mines of the Mississippi Valley, or at least transportation therefrom, were in the hands of the Confederacy.

The first water mains of early America were bored-out logs, sections of which are preserved to this day as museum pieces. At the end of 1822 there were still 32 miles of wooden water pipes in use in the city of Philadelphia. However, the transition in that city from wooden pipes to iron ones began in 1818 with The Fairmount Water-Works. But the installation that began in 1799 along Chestnut Street still made use of wooden pipes.

As of the late 1700's many references become available as to lead piping. One is presented as an example:

1792, June 14 (abstract of letter and note from Robert Goode and others to the Governor of Virginia—*Calendar of Virginia State Papers*, edited by Sherwin McRae and Wm. Palmer (1855):

"Mr. Minor will soon furnish the entablature, & it is indispensibly necessary to convey the water from the outlets of the Roof by wall pipes of Lead; . . . . . ."

Note (No. 3) June 14, 1792:

"State of the expence of the wall pipes, the plaistering of the ceiling, & the covering of the Pedestal Cornice:

4,000 Lbs lead for 8 wall pipes at 9d p. lb.	£150	0s	0d
450 y'rds of Piastering in the ceiling of the Portico @ 2s, 6d	56	5	0
3 tons of Lead for covering the Pedestal Cornice and workmanship	138	0	0
	£344	5s	0d"

It may be inferred that plumbing at that time scarcely had reached into the interior of houses. Mention chiefly is of gutters and downspouts. It appears to be true that smaller communities relied upon leaden handmade pipes or troughs for water transportation and only for short distances. In order that no impression be gained that the plumbing industry at that period was immense, it is recorded that for the relatively late year of 1840 the total volume of the plumbing business for the United States did not exceed $200,000.

The evil consequences that could spring from water brought into contact with lead, whether pipes or vessels, quickly began to appear. Consonant as to time but not to location is the following:

"A whole family, according to the report of Van Sweeten, was attacked by paralysis, for having for a long time made use of water contained in a large vessel of lead. Another family experienced the same disease, for having drank the water of a well, loaded with selenite, and which had attacked the lead of which the vessel was composed that served for drawing the water. The father of this family was for a long time attacked with palsy; the mother died in consequence of a long and painful colic, accompanied with icterus: out of 21 children, 8 died in infancy, and the others were ill everytime they came to their father's house. There are likewise instances of unfortunate accidents occasioned by water transmitted through leaden pipes, or by rain water falling off the roofs of buildings covered with lead, and received afterwards into vessels." (M. P. Orfila—1817.)

"It is very dangerous to drink water which has been kept for a long time in leaden vessels exposed to air: . . . . It is equally necessary to avoid drinking well water drawn in leaden buckets. And unhappy consequences have been observed in persons who have drank of rain water, that had been conveyed by leaden pipes, or which had fallen upon roofs covered with this metal, and afterwards been retained in vessels." (M. P. Orfila—1818.)

The situation as to eaves and downspouts of lead as of the year 1833 is set forth by Ducatel:

"Rain or snow water, collected in the country at a distance from houses, and before it touches the earth, being nearly as pure as distilled water, will act with almost equal rapidity on lead. Even when collected in a great city, and in circumstances which, at first sight, would appear not very favorable to its action—for example, from eaves-droppings a few hours after the beginning of a shower, it retains a little of its corroding power; and when collected in like manner after twelve or twenty-four hours' rain, it corrodes almost as rapidly as distilled water. Hence, perhaps, even in a town, but at all events, certainly in the country, it would be wrong to use, for culinary purposes, rain or snow water, which has run from lead roofs or spouts recently erected. Where the roof or spout has been exposed for some time to the weather, the danger is, of course, much lessened, if not entirely removed; because exposure to the weather encrusts it with a firmly adhering coat of carbonate, through which even distilled water will not act. But it would still be right to condemn the turning even of old leaden roofs to the purpose of collecting water for the kitchen. For, although the purest rain water cannot act on them when it is once fairly at repose, we do not know what may be the effect of the impetus of the falling rain on the crust of carbonate; and if the crust should happen to be thus worn considerably, or detached by more obvious accidents, the corrosion would then go on with rapidity as long as the shower lasted."

Quite early observers well understood the peculiar qualities of water that were conducive to lead poisoning when such water was transported or stored in leaden appliances. One early writer states:

"It is a well-known fact that water, in pass-

ing through lead pipes, is very liable to become impregnated with the metal, if there is any access of atmosphere, and even where there is no access of air, if the water contain much carbonic acid, as is often the case, a portion of the metal will get into the water and poisoning may ensue from its use—and the *purer the water*, the greater the danger of poisonous absorption."

The Dana Investigation

IN 1848, Dr. Samuel L. Dana, of Lowell, Massachusetts, published his translation of the memorable work on lead diseases by Tanquerel Des Planches. Hidden away as an appendix to this translation is the record of Dana's own investigation "On the Use of Lead as a Conduit or Reservoir for Water for Domestic Purposes." It appears that the city of Lowell at that time faced a serious epidemic of a condition believed to be lead poisoning. By that time the medically inelegant term of the earlier period, "dry gripes," had disappeared. The physicians of the community petitioned the city council to authorize an extensive investigation of the city's water supply with reference to lead. Dana shared in this investigation and may have been the leader in the inquiry. His epidemiologic approach is admirable. First he set about previous experiences. One item, from Europe, exemplifies the profitable returns that came to him:

"The case of Tunbridge in England is full of instruction, not only on the fact of continued action of water on lead, but it demonstrates also how small a quantity of lead will produce serious disorder. This water was analyzed, by the celebrated chemist Dr. Thomas Thomson, who found it remarkably pure, containing 1/38000 of saline matter, three-fourths of which were chloride of sodium or common salt. In 1814 a pipe of lead was laid to conduct this water about one quarter of a mile to Tunbridge, for the use of those who chose to take it. In about a year after the water was used, a great many cases of colic, and one at least of paralysis, evidently lead diseases, appeared. The water was examined, and lead discovered in it by Prof. Brande, of the Royal Institution. Iron was then substituted for the lead pipe. Lead maladies disappeared.

"The quantity of lead was almost inappreciable, and escaped the acute analytical tact of some of the best chemists of that day; a fact which Christison thinks may be due to the carbonic acid of the air having precipitated the dissolved hydrated oxide of lead, by exposure of the water submitted to experiment. The whole case is a lesson that chemists should be cautious in deciding that a cause of a disease did not exist in the use of water from a lead pipe, when experience shows that, the supposed cause being removed, the effect ceased.

"Remarking on the purity of the Tunbridge water, Christison observes, 'no such water can be safely conveyed in new lead pipes.' It is believed that had the lesson which time has taught him, been earlier acquired, Christison would not have limited safety to new pipes only."

He then went about the business of examining in the laboratory water samples of many types —spring, well, lake, river and city waters—from nearby sources. He came to the conclusion that some waters have a natural content of lead. A third step was directed to the action of various waters and various salts upon metallic lead. Dana came to the conclusion that the purer the water, that is the softer, the greater the prospect of lead with which the water might come into contact, the greater the danger. To this was added conclusion that carbonic acid was a salient contributor.

As a portion of the study, letters were addressed to numerous physicians, far and near, located in communities where lead piping conveyed water supplies, seeking their experience. One letter from another physician of Lowell, Dr. John C. Dalton, adequately reveals the situation:

"Dr. Dana, "Lowell, April 23, 1848

"Dear Sir:—You expressed a wish the other evening to be apprised of any facts, within my experience, of the deleterious action on the system, of water impregnated with the salts of lead from transmission through pipes of this metal. During the years 1838 and 1839, cases were of frequent occurrence in the practice of many physicians in this city, of derangement of the functions of the stomach and bowels, more or less severe, of a somewhat peculiar character. They were marked by constipation, impaired appetite, emaciation, frequent attacks of colic, a dingy, sallow aspect of the skin, approaching to the bilious, but unattended with yellowness of the conjunctiva, general loss of strength, wandering, shooting pains of the limbs, which in some of the severer cases, became perfectly paralyzed. The attacks were sometimes sudden, but for the most part supervened gradually.

"Although there were here and there cases in other parts of the city, the larger majority, and the most severe and protracted ones, occurred in that portion of it embracing what is called Chapel Hill.

"They were generally very intractible, yielding very imperfectly to judicious treatment (in the then ignorance of the cause), and returning in all their severity as soon as these measures were intermitted. In some cases, several, and, occasionally, all the members of a family would become similarly affected in different degrees. In one family, under my care, whose supply of water was through lead pipe, four hundred feet in length, all the members were attacked, the transient ones with constipation, colic, &c.; the more permanent ones with the severer symptoms; going on in one case to perfect paralysis of both lower extremities. Domestics residing but one week in this family became similarly affected. From the resemblance, nay identity, of many of these cases, to the affections of painters and others, whose employments expose them to the action of lead, suspicions were very soon awakened as to the cause; analyses of the water, in some of the suspected wells were instituted, principally, I think, by yourself, and notable

quantities of lead in almost, if not quite in every instance detected; the pipes, on examination, exhibited unequivocal marks of the solvent action of the water upon them; their surfaces being in some places very thinned, and in others riddled with perforations. The matter assumed so much importance that a memorial was addressed by the physicians to the city government, requesting that measures might be forthwith instituted for its thorough investigation. This memorial was favorably received, and a report embodying the results of chemical research subsequently given to the public. The consequence was, that, to a great extent, lead pipes were removed, and others of iron or other material substituted; from this time, obstinate and protracted cases began to recover permanently; new cases became rare, and for the last several years have been uncommon; but where they do occur, are invariably traceable to the cause above assigned. A year ago, a lady removed from Tewksbury to a residence on Chapel Hill, and although previously in the enjoyment of good health, became soon affected with symptoms bearing unequivocal evidence of their saturnine origin. After having been under treatment unsuccessfully pursued for months, under different practitioners, she recovered rapidly under simple treatment, on withholding the use of the water of the house, which was brought from a considerable distance through lead pipe. About three months since, I was called in consultation, by an intelligent physician of Westford, to a protracted case of a similar character with the above, which he had just begun to suspect had a similar origin, from discovering the characteristic 'blue line' at the edge of the gums, and from the fact that lead pipe had been not long before substituted for wood, for the supply of water to the family. I at once coincided with this view, and the result was, as I have since learned, a speedy and perfect recovery.

"I have quite recently had under my care, a very obstinate case of paralysis of the extensor muscles of the arms, in a female, precisely resembling the affection not uncommon among painters, which is accurately described and drawn in Pemberton, 'On some Diseases of the Abdominal Viscera.' This case also originated on Chapel Hill, and was traceable to the long continued use of lead water, but still remains uncured, notwithstanding the removal of the cause, and the adoption, from time to time, of every variety of treatment, irregular as well as regular, which seemed to promise relief.

"These and many other cases of more or less pronounced character, which have come under my observation, have impressed me strongly with the injurious influences of this poison, thus insidiously introduced into the system; and I have for many years past exerted my influence to prevent the use of lead pipe, as a medium of conveyance for water to be used as a beverage.

"I believe it to be a prolific cause of many anomalous cases of deranged health, when the more prominent symptoms do not appear, (by which they might be readily traced to their true cause,) and have been strongly inclined to suspect that it may often be at the foundation of the thousand and one forms of the nervous affections which afflict modern life and perplex and puzzle the modern physician, by their Protean forms and intractable character."

Apparently all in good time a report was submitted to the Council and the lead pipes disappeared—and with them disappeared the lead poisoning in Lowell.

Present Day Lead Conduits

IN 1952, the Lead Industries Association published the book "Lead in Modern Industry." One chapter begins, "Lead has probably a longer record of satisfactory performance than any other water service pipe material. As a consequence, it is used extensively for that purpose today, and many of America's greatest cities use it exclusively."

It is improbable that any American city, large or small, now exclusively relies upon lead piping. Yet it remains that over the land many tens of thousands of residences throughout are equipped with lead pipe. Lead poisoning is not commonplace therefrom and most householders are unaware of any potential threat. One situation has failed to attract the attention that it deserves. Many communities in which lead plumbing may be widespread are installing water softening processes as community projects. The altered quality of the water may not maintain the protective incrustation of the interior of lead pipes so that the hazard of lead poisoning increases. Occasionally lead poisoning arises on this account but nowhere is that condition known to be rampant.

In the installation of non-lead plumbing for individual residences or housing projects, it is the usual practice to apply to threaded areas lead compounds in oil for sealing purposes. It was anticipated that for temporary periods such lead might provoke lead poisoning among water consumers. Through chemical examination of water supplies, it has been determined that this lead is little soluble and that when dislodged the "slugs" are sufficiently large to attract attention and be discarded.

An era of plastic conduits for household purposes is just beginning. For technical reasons some lead early was introduced into some products. The undesirability of this step became obvious and substitutes for lead have been located.

In fairly modern times, studies such as that of Wright, Sappington, and Rantoul have been directed to the content of lead in the water supplies of residences long equipped with lead plumbing. There is no reason to believe that had such studies been conducted a century earlier any dissimilar quantities of lead would have been detected provided the quality of the water were the same. The authors mentioned, working in New England, concluded that lead poisoning was of frequent occurrence. Sixty-three cases were detected in 21 communities. Moreover, sufficient lead was detected in water supplies to account for these poisonings. Some patients acquired lead

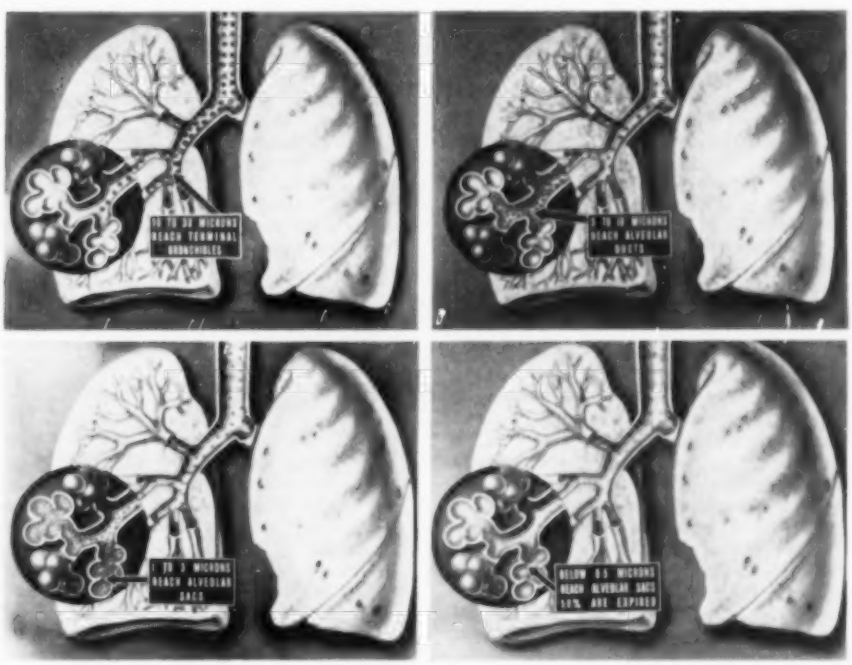
poisoning when apparently the daily intake of lead was as little as 0.1 milligram but the exposure period averaged more than eight years. This figure is not far removed from the daily normal intake of lead from foods and air everywhere. In a few instances the quantity of lead in water exceeded one milligram per liter, which is significant. Apparently the content of carbon dioxide gas in water is a salient factor in bringing about a high content of lead. In view of such findings, it becomes a matter of wonderment that over the country lead poisoning from lead plumbing is not more frequent—or perhaps the wonderment should be that so few cases of lead poisoning from this source are detected and reported.

Final Appraisal

APPRAISAL of the long term period (1600-1850) provides the conclusion that at least for the first century of colonial life neither lead piping nor lead poisoning from such source was commonplace. In fact, no lead poisoning is provable. In the last quarter of the 1700's water conduits of lead along with lead gutters, flashings, downspouts and roofing frequently are mentioned. In the first half of the 1800's the use of such devices was widespread. Evidence of lead poisoning from such causes becomes exact and is fairly abundant. Apart from lead worms as used in distilleries, the first substantial "case histories" of lead poisoning are related to lead plumbing as the etiology.

Decline of the Dust Count

LONG the axiom has been that any dust floating in the atmosphere that may be seen by the naked eye will not produce silicosis. Possibly this is giving way to the more stringent axiom that dust particles that may be counted by ordinary procedures will not produce silicosis. With the particles below .5 micron, the fact that 50% are expired probably is less important than that 50% are retained, since


10 TO 30 MICRONS REACH TERMINAL BRONCHIOLES
5 TO 10 MICRONS REACH ALVEOLAR DUCTS
1 TO 3 MICRONS REACH ALVEOLAR SACS
BELOW 0.5 MICRONS REACH ALVEOLAR SACS 50% ARE EXPIRED

it is beginning to be realized that the ultramicroscopic sizes may be the most damaging. More and more the emphasis is upon the ultramicroscopic silica particle in the causation of silicosis. Only particles which reach the alveolar sacs can cause pneumoconiosis because it is only in the sacs that phagocytosis takes place. All this is relegating the warmly embraced dust count to a lesser role in environmental appraisals. In a measure, the worth of dust counts is akin to seeing smoke and being sure that somewhere there is fire. [The diagrams are from the color motion picture film entitled "Occupational Health," produced by Medical Film Guild, Ltd., 506 West 57th Street, New York 19.]

Jurisdictional Variations in Permanent Disability Awards

MEDICAL Report Presented by the Medical Committee at the 1953 Convention of the International Association of Industrial Accident Boards and Commissions:

Following discussion, your Medical Committee decided to attempt a generalized and limited discussion of permanent disability rating and evaluation methods throughout the United States and Canada. The last serious attempts to discuss this controversial subject by a Committee of the I.A.I.A.B.C. took place in the years 1923 and 1928. So much criticism, hard feelings and difference in ideology arose that further discussion was abandoned for the good of the organization as a whole.

In reviewing the literature of these early controversial years it was plainly evident that the main issue and basic fundamental concepts, in which we are all primarily interested, were clouded and befogged by senseless comparisons between individual states and individual provinces. Compensation administrators felt that it was their solemn duty to uphold, argue and plead for their particular law, despite its merit or lack of merit.

Thirty years have since elapsed, bringing wars, periods of depression, and economic change. Even since 1940 there has been an industrial and economic revolution with marked advances in labour relations. Despite this period of progress in allied fields there has been little, if any, change in workmen's compensation laws and administrations, particularly in the field of permanent disability evaluation.

We believe it is obvious to any expereinced compensation administrator that the wheels of progress have become mired and bogged down in an entangled mesh of legalistic procrastination and red tape. The cause of this dilemma is not hard to find. Critical analysis of some of our laws shows there is still an underlying tendency to buy off the injured workman—to place strict emphasis on monetary values for certain injuries, forgetting all too often that we are dealing with complex human individuals rather than machines. Until and unless there is a change in our basic thinking and philosophy, evaluation for permanent disability will still remain the jumbled, confused chaotic mess it is today.

Your Committee realizes that any recommendation it might make to this Association cannot be carried out under some of our existing laws. It was felt, however, that the principles enunciated might possibly stimulate commissioners to re-examine their jurisdictional laws and powers, and if found wanting bring them to the attention of their legislators. If only this much were accomplished, it is felt that the report would serve a useful purpose.

Read at the meeting of the I.A.I.A.B. & C. at Coronado, California, on October 7, 1953. The members of the Medical Committee are: DR. E. C. STEEL, Ontario, Chairman; JAMES J. REID, South Carolina, Vice-Chairman; DR. J. L. BARRITT, California; DR. JOHN E. DONLEY, Rhode Island; FRANK A. FARRINGTON, Maine; J. FRANK HUSKINS, North Carolina; WILLIAM MCCAULEY, U.S. Department of Labor; DR. J. R. NADEN, British Columbia; THEODORE P. RYAN, Michigan; VOYTA WRABETZ, Wisconsin.

IN ORDER to point up the wide variation and difference in thinking between the various jurisdictions, your Committee sent out the following questionnaire:

"A 28 year old married man, previously in good health, who has been employed as a truck driver for two years, at wages of $60.00 per week, meets with a compensable accident and suffers an amputation three inches above the level of the wrist joint. He returns to work four months later at a different job. His amputation stump is completely healed and he is wearing a satisfactory prosthesis. On his return to work he receives the same rate of pay as before.

"Would you kindly state how much money he would receive as compensation for the permanent disability. If a monthly pension for life, please state the capitalized value of such pension."

The questionnaire was answered by 45 States and Territories and by 10 Canadian Provinces, making a total of 55 jurisdictions in all. We have the tabulated results of this survey (Table I). There is over a twenty-thousand-dollar spread in the benefit awards for the loss of a hand three inches above the wrist. As mentioned, your Committee brings this to attention merely to point up the wide variation in the different jurisdictions. We definitely take no stand as to who is correct or incorrect, or what is right or what is wrong. It is axiomatic in the field of medicine that the greater the spread and difference of opinion with regard to treatment, the less is known about the etiology and pathology of the disease

TABLE I.

AMOUNTS OF PERMANENT DISABILITY AWARDS PAID BY COMPENSATION AGENCIES IN THE UNITED STATES AND CANADA, IN ANSWER TO THE QUESTIONNAIRE OF AUGUST 21, 1953, ISSUED BY THE CHAIRMAN OF THE MEDICAL COMMITTEE, I.A.I.A.B.C.

Alabama	$ 3,450.00	New Brunswick	13,504.57
Alberta	20,788.50	Newfoundland	20,805.00
Arizona	8,484.60	New Hampshire	5,412.00
Arkansas	3,750.00	New Jersey	6,900.00
British Columbia	19,836.62	New Mexico	3,900.00
California	7,560.00	New York	8,985.00
Colorado	3,094.00	North Carolina	5,100.00
Connecticut	6,240.00	North Dakota	4,400.00
Delaware	6,600.00	Nova Scotia	18,491.48
Florida	6,125.00	Ohio	4,025.00
Georgia	4,200.00	Ontario	19,578.00
Hawaii	7,420.00	Oregon	6,750.00
Idaho	5,250.00	Pennsylvania	6,337.50
Illinois	6,525.00	Prince Edward Island	20,212.50
Indiana	6,000.00	Puerto Rico	3,000.00
Iowa	5,068.00	Quebec	19,521.60
Kansas	4,900.00	Rhode Island	3,980.00
Kentucky	3,600.00	Saskatchewan	24,306.75
Louisiana (inc. T.T.)	5,850.00	South Carolina	6,750.00
Maine		Tennessee	4,200.00
Manitoba	19,390.00	Texas	3,750.00
Maryland	4,505.00	Utah	5,500.80
Massachusetts	4,200.00	Vermont	3,500.00
Michigan		Virginia	3,750.00
Minnesota	8,645.00	Washington	3,690.00
Mississippi	5,000.00	West Virginia	6,600.00
Missouri	7,000.00	Wyoming	3,400.00
Montana	5,300.00		

being treated. Let us draw a corollary: Is this not true in the case of permanent disability evaluation and rating? When the chips are down, do we honestly know anything about permanent disability rating, or are we just bluffing?

Take a look at Table II, with particular reference to the last column. This refers to the ratio in percentage of all permanent disability awards to the total number of lost-time compensable accidents. These figures were furnished by the National Council on Compensation Insurance. Your Committee takes absolutely no responsibility for interpreting these figures, nor for drawing conclusions from them. For the past three years the Medical Committee has emphasized and re-emphasized the glaring and obvious need for control of medical care by the various Compensation Boards and Commissions in the different jurisdictions. This analysis, taken on its face value and admittedly without the detailed study that it rightly deserves, would seem to justify and verify the position taken by this Association at the Detroit Convention in 1951 with regard to the supervision and control of medical care. Comparisons, particularly international comparisons, are odious and in bad taste. In looking at these figures, however, one cannot help being amazed at the high ratio of permanently disabled workmen in those states which do not exercise medical supervision compared with the last three ratios on the sheet, namely, Alberta, British Columbia and Ontario, which exercise rigid and complete medical control along with an extensive rehabilitation program.

TABLE II.

AVERAGE PERMANENT DISABILITY CASES 1949-50-51 AND RELATION OF PERMANENT DISABILITIES TO TOTAL COMPENSATION CASES

State or Province	1. Perm. Total	2. Major Perm.	3. Minor Perm.	4. All Perm.	5. All Comp.	Ratio All Perm. All Comp. %
Ala.	3.0	97.3	454.7	555.0	6545.7	8.48
Ark.	4.3	178.0	1045.3	1227.7	6860.0	18.61
Calif.	57.3	1654.3	8690.0	10401.7	63309.3	16.43
Colo.	4.7	93.3	616.3	714.3	4560.0	15.66
Conn.	9.0	287.7	2360.3	2657.0	14847.7	17.89
D.C.	2.3	74.0	380.3	456.7	3871.7	11.79
Fla.	9.0	240.0	1217.3	1466.3	19134.0	7.66
Ga.	11.3	232.7	1097.3	1341.3	10067.0	13.32
Hawaii	1.7	21.0	115.7	138.3	2040.7	6.78
Idaho	—	9.3	39.3	48.7	580.3	8.39
Ill.	14.7	774.7	8341.3	9130.7	29846.7	30.59
Ind.	6.0	399.3	2502.3	2907.7	16337.7	17.80
Iowa	7.3	149.0	774.7	931.0	10196.0	9.13
Kans.	5.7	178.3	908.3	1092.3	6208.3	17.59
Ky.	9.3	192.0	810.3	1011.7	6958.7	14.54
La.	41.3	520.7	1245.3	1807.3	18771.3	9.63
Me.	.3	45.3	306.3	352.0	4150.7	8.48
Md.	8.0	310.3	1700.3	2018.7	12896.3	15.65
Mich.	41.3	467.3	1766.0	2274.7	24879.0	9.14
Minn.	7.0	224.3	1239.7	1471.0	8844.3	16.63
Miss.	3.7	113.3	437.7	554.7	6324.7	8.77
Mo.	8.7	423.0	3072.0	3503.7	18423.0	19.02
Mont.	.3	24.3	50.7	75.3	622.3	12.10
Nebr.	5.7	95.7	522.7	624.0	4750.3	13.14
N.H.	2.3	83.3	300.7	386.3	4965.3	7.94
N.M.	4.7	94.0	357.3	456.0	2569.7	17.74
N.C.	9.7	245.7	1454.3	1709.7	11473.7	14.90
Okla.	6.0	377.0	1831.0	2241.0	7474.3	29.62
R.I.	4.3	131.3	218.7	360.3	4684.7	7.69
S.C.	5.0	212.3	1084.0	1301.3	7398.0	17.59
S.D.	1.3	20.0	76.0	97.3	944.0	10.31
Tenn.	10.7	234.3	1189.7	1434.7	9358.7	15.33
Texas	47.0	1804.7	9210.0	11061.7	46046.0	24.02
Utah	5.3	40.0	275.3	320.7	3795.3	8.45
Vt.	3.0	35.0	233.0	271.0	1760.0	15.40
Va.	3.0	183.3	1499.7	1686.0	12105.0	13.93
Wis.	7.7	257.0	2449.3	2714.0	24825.0	10.93
Alta.	—	—	—	730.0	15625.0	4.67
B.C.	35.0	153.0	1203.0	1391.0	27182.0	5.12
Ont.	35.0	193.0	1939.0	2157.0	57268.0	3.77

Provinces—1952 figures only.

YOUR Committee has outlined a few generalities in respect to disability rating and evaluation for consideration. These are as follows:

1. Recognition that compensation benefits and payments during the acute phase of illness following the accident or occupational disease should continue until the condition becomes static, or until the claimant can resume full or modified employment.

Explanation: Permanent partial, or permanent total disability means exactly what the word "permanent" implies, namely, that the condition will be more or less static and unchangeable during the lifetime of the claimant. Your Committee feels that both the principle and the purpose of compensation benefits paid during the acute or healing period are entirely different in concept and meaning from the awards paid for permanent disability.

2. Recognition that maximum medical restoration of function along with adequate readjustment from a physical, sociological and mental standpoint is a necessary prerequisite of disability rating. Such maximum medical restoration should be supervised and controlled by the various compensation agencies.

Explanation: Hitherto in a great many jurisdictions emphasis has been placed on early settlement. The compelling attitude has been to get rid of the case and close the books. Over-emphasis on speed of settlement before the claimant is completely recovered from his physical and mental injury is detrimental to the claimant. Such lump sum settlements, we know, are greatly sought after by both the insurer and the insured. All such awards are later found to be completely inequitable and based on inadequate medical testimony. Your Committee makes a strong plea for a complete shift of emphasis and priority. We feel that complete physical restoration with advanced medical care, coupled with rehabilitation and readjustment, is much more valuable and important than hasty monetary consideration.

3. Recognition that rehabilitation in its broadest aspect is both desirable and a necessary forerunner of successful permanent disability rating.

Explanation: Rehabilitation is the end point of the compensation processes regardless of whether we are working under a so-called forensic or clinical system. Successful permanent disability rating, particularly in unscheduled or controversial scheduled cases, depends to a large extent on how successful we have been in our primary medical care, physical rehabilitation, work assessment, job placement efforts, and vocational retraining.

4. Recognition that permanent disability within jurisdictional limits is a clinical rather than a legal problem and that insofar as practical all ratings should be made by experienced, trained personnel employed by the commission, including at least one or two physicians specializing in this work.

Explanation: Disability evaluation is a medical

speciality requiring a high degree of skill, training and experience. Human beings are complex mechanisms with many factors influencing their well-being, attitudes and behavior. They differ so widely in their reactions and adaptability that each must necessarily become an individual problem. We believe that the responsibility for the injured worker's future rests with the commission and this responsibility should not be delegated.

5. Recognition that in moderately severe and severe disabilities pensions for permanent disability should be calculated and awarded on a lifetime basis.

Explanation: More and more jurisdictions throughout the United States are paying sizeable awards in weekly installments up to five and 10 years' duration. Your committee feels that this is a step in the right direction, but that it does not go far enough. The worker still has his disability after this period and he has reached an age when his earning capacity is reduced. Thus his payments stop when they are most needed. Large lump sum settlements given without restriction would appear to have practically no place in compensation administration.

6. Recognition that any rating schedule should be used only as a guide in disability evaluation and that procedural right should be vested in administrative bodies to vary this within certain limits.

Explanation: The rating schedule should be our servant and not our master. (No two disabilities are alike in their effect upon individuals.) In dealing with permanent disability awards we are dealing with the effect of the injury, not the injury itself. We are primarily concerned with inequity in disability rating and feel that jurisdictional rights, within certain limits, should be given to compensation administrative bodies so that they might exercise to a limited degree discretionary powers.

7. Recognition that disability awards and pensions should be subject to review during the lifetime of the claimant, providing medical evidence is produced to show that the condition for which the rating was made has changed.

Explanation: Medicine is not an exact science. Disability evaluation calls for exacting end result studies and prognosis—mistakes are more common in the field of prognosis than any other branch of medicine. Without a procedure of review in doubtful cases, injustices and inequities are bound to arise.

8. Recognition that our present system of compensating for permanent disabilities has not kept pace with advances in modern industrial and sociological thinking.

Explanation: Realization of existing inadequacies is a good approach to the need for a change in our basic concept and philosophy of permanent disability ratings.

9. Recognition that at the present time uniformity and standardization of permanent disabilities throughout the various jurisdictions is neither feasible, practical nor desirable, but that a shift of emphasis to equality of medical treatment with full rehabilitation measures would narrow the gap between awards made by different jurisdictions under our existing laws.

10. Recognition that there is a definite need for a complete scientific study of all aspects of disability ratings on both a state and national level. This study is of such importance both economically and socially that it can only be undertaken by a full-time committee adequately financed.

The Cancer-Causing Factor?

WHAT to do? One obvious answer is to isolate and purify whatever it is in cigarette tar that causes cancer. Then, perhaps, experimental cancers can be produced faster. But no less than 45 different substances have been identified (and many more are suspected) in the tar; 15 of these, including nicotine, have been tested for cancer-causing powers and acquitted, and most of the other 30 seem unlikely culprits. At New York University's Institute of Industrial Medicine, Chemist Alvin Kosak and Physician William E. Smith are breaking down tobacco tar into several fractions and testing each on mice. Parallel work to that at N.Y.U. is going on at two or three other laboratories in the United States and half a dozen in Britain. Dr. Wynder himself, now working with Rhoads at Memorial, is digging into the relationship between cigarettes and cancer of the larynx. There is no reason why research of this type should not pay off quickly if there is enough money for an all-out effort. There is a perfect textbook example: in 1945 the Standard Oil Company of New Jersey sent a cancer-causing oil to Memorial and later to N.Y.U.'s Institute. The cancer-causing factor was identified and measures were perfected to limit the use of the oil and keep workers from being exposed to it. In the case of cigarettes, researchers are confident that the cancer-causing factor can be (1) identified and (2) removed from the tobacco in manufacture. Half a year has passed since Britain's Dr. Harvey Graham (no kin to St. Louis' Graham) suggested that the tobacco companies should pay for the research to bring these things about (*Time*, April 6). So far, no big cigarette maker in Britain and only one in the U.S. has made a major move toward financing such research. This U.S. company's funds filter through the Damon Runyon Memorial Cancer Fund to the N.Y.U. project. Says Dr. Ochsner: "If the tobacco people are smart—as I am sure they are, because they have been enormously successful—they will support research to find out what the cancer-producing substance is, and then take steps to remove it." Dr. Evarts Graham: "The cigarette companies are trying to induce more cigarette smoking, particularly among the young . . . . many of whom will become cancer victims 20 years or so from now . . . . It is certainly the moral obligation and common sense on the part of the manufacturers to support research. If we here at Washington University had more funds, we could get along faster and perhaps arrive at satisfactory conclusions within a couple of years or so." —*Time*, November 30, 1953.

Industrial Medicine on an International Basis

CARL M. PETERSON, M.D., Secretary
Council on Industrial Health, American Medical Association

A MONTH or two ago word was received from Geneva that the Industrial Hygiene Division of the International Labor Office had been discontinued as such and its remaining functions absorbed by the Safety Division. In the words of the Director General, this fusion was undertaken with the intent of improving internal administration. In his opinion the new combined Division of Occupational Safety and Health would make for greater efficiency, reduction in overlap and improved coordination. Nevertheless this action was regarded as a serious threat to industrial medicine by influential professional people in Western Europe, where a great deal of the stimulus for improved industrial health and welfare derives from official labor departments. In fact, an appeal has been broadcast, suggesting that participating governments in the International Labor Office structure be requested to file official protests. The International Labor Office began its work in accident prevention and occupational disease control as early as 1920. Although the total record of accomplishment is impressive, its impact in recent years on world industrial medicine has not been outstanding.

Meanwhile the World Health Organization has proceeded very cautiously because of the ILO's priority position. The first World Health Assembly in 1948 recommended a joint ILO WHO Committee on Occupational Hygiene and in due course such a body was created. This Joint Committee has directed its major attention to practical ways in which official agencies can cooperate in the extension and improvement of industrial health services. Also in 1950 a Section on Social and Occupational Health was established, with a central staff and with expert consultants in various fields and capacities. The chief of this Section has recently said that "We have barely scratched the surface of the enormous problem, which is always growing larger as the nations of the world gradually become more industrialized. WHO can hope perhaps to have some minor impact on international developments only by keeping its objectives limited—limited to organizational and administrative aspects in developing balanced health services for workers, with the participation of national ministries and departments of health. It cannot hope to grapple with the enormous jungle of technical problems involved in the prevention of specific diseases and accidents." It is not clear at the moment if the recent ILO action will modify this general statement of principle.

The other important agency in the international scene is the Permanent International Committee on Industrial Medicine. This Committee consists of 170 members representing 35 countries on the five continents. This organization can properly be described as an association of specialists intimately and for the most part exclusively concerned with the manifold aspects of occupational health service. Its major appeal is to career people and as such it has a devoted following—without, however, any status, official or otherwise, as representative of any national authority or organization. Its major activity is a biennial conference which provides the means for a general interchange of experience and information relative to the "jungle of technical problems" to which reference has already been made. The loose organization of this permanent committee and the limitations of contact medically speaking to those who attend its meetings, make the influence of this body intermittent and esoteric.

Here then are evidences of realignment or at least readjustment in the global industrial health situation. The ILO is reorganizing and perhaps contracting its program. The WHO expects to limit its approach to organizational and administrative aspects for implementation by the appropriate ministries of affiliated nations. The Permanent International Committee has no clearly defined ties with governmental agencies or national professional organizations. There never has been conspicuous participation in planning or procedure by the organized associations of medical practitioners throughout the world. Is it not, therefore, a propitious time for the World Medical Association to assess its role in this dynamic area? Can we grasp a great opportunity for medical men everywhere to join forces with labor and management to advance the standards of industrial health accomplishment in terms of positive action under conditions of professional independence and enterprise?

OBVIOUSLY every country with any degree of industrialization has industrial health problems. There is a great variation in kind and intensity, as well as methods of meeting these situations. Nevertheless the ingredients essential to progress are universal—so much so that what we have come to regard as important in the United States may have pertinence as an agenda for consideration elsewhere. A partial list of factors which in our opinion will strongly test the adaptive nature of medical service might be enumerated as follows:

1. What will be the ultimate distinction, if any, between occupational and non-occupational disability under the changing aspects of social security and insurance? What effects will these forces have on the industrial physician and his relation to his professional colleagues?

2. Can the physical, biological and social sciences be mobilized to cope with the psychic and somatic disturbances increasingly identified as the products of our industrial society? How will these disciplines

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react to or attempt to influence the peaceful uses of nuclear energy?

3. Can we launch a coordinated attack on sickness absenteeism in industry through an intensified application of known preventive principles based on a unity of interest and support from management, labor, government and the health professions? Can we devise a formula under which industrial health benefits can be extended to the smaller plant and practitioner participation with support from essential consulting services?

4. Can we transform the conventional industrial medical department into a true health center, and what should be the role of such a center in relation to other community health and medical services?

5. What is needed to identify the composition of the industrial health team and the parts to be played by the doctor, engineer, nurse and technician?

6. What can be done to help solve the crucial problems of aging, health and employment?

7. What is needed in the way of instruction and stimulus in order to extend curative medical services into the related fields of rehabilitation and proper job placement?

8. Should there be better integration between school and industrial health activity, and how?

9. What is the opportunity to use industry as an avenue to apply existing knowledge and to promote needed research into the health status of apparently well adults?

IT SEEMS to me that physicians the world over should have a clear understanding of what these potentials may mean. We all have much to communicate and much to learn from each other. The World Medical Association has not only an opportunity but an obligation to see that practicing physician participation in industrial medical affairs is properly represented at international levels. I should like to propose the following steps:

1. That a committee be appointed by World Medical Association to concern itself with the formulation and promulgation of standards for better medical and health services to employed groups.

2. That this committee give prompt attention to the preparation of a report on the relation of the physician to the major components of industrial health—workmen's compensation, rehabilitation, medical care, administrative relationships, preventive medicine, environmental hygiene, health counseling, and health education?

3. That this committee meet at an early date with representatives of the ILO/WHO and the Permanent International Committee on Industrial Medicine to define specific objectives, spheres of action, and working relations.

4. That this committee sponsor a discussion at an early session of the World Medical Association, independently or in conjunction with the agencies noted above, to bring into focus its own program with that of the existing international bodies.

I BELIEVE that in this way the medical practitioner everywhere, individually and through his professional organizations, can begin to understand more clearly the health problems of the worker and his employer, can appreciate the tremendous importance of health and medical services in collective bargaining and negotiations, and with that knowledge he can help shape the course of future events.

Occupational Stress

IT IS difficult to evaluate the tolerance of the human organism because of enormous variation between individuals. It is almost equally difficult to evaluate degrees of occupational stress, since "one man's meat is another man's poison." Nevertheless, we must do our best. It is one of our greatest contributions to industry, and one of our greatest challenges. There are no other skills available to industry which equal ours in this area. Because of its importance and our unquestioned superiority, it is our grave responsibility to proceed objectively and in accordance with the tenets of our scientific training, never forgetting that the art of medicine, in addition to its science, is as important in industry as in all other forms of medical practice. In order to exert his best professional judgment based on years of training and experience in this eternal question of stress *versus* tolerance, the physician must, first, have thorough knowledge of the material at hand, in this case human. He must understand each individual's points of weakness and his points of strength. He must try to judge whether for the particular individual under observation, increased responsibility is a burden or a joyous challenge. Physical points of weakness, such as visual and hearing defects, flat feet, deformities, diminutive size, and weak muscles are fairly easy to assay and record. It is equally important for the physician in industry to make some estimate of the individual's psychological weaknesses and strengths. This obviously requires some psychiatric orientation, with a full appreciation of the many psychosomatic disorders which may develop as a result of the many types of mental conflict. Among the commonest of these, which the industrial physician must try to understand, are the stresses and strains arising in the home and family. Second, the physician in industry must have a thorough knowledge of the various stresses inherent in certain jobs. Whether it be the number of pounds a man can safely lift in loading a cargo, or the number of complex problems a top executive may safely take on without becoming upset and frustrated, the industrial physician is by training and experience best qualified to detect the early signs of the individual's break-point.

—From "The Stress Disorders," by WILLIAM P. SHEPARD, M.D., presented at the Medical Conference of the Eighteenth Annual Meeting, Industrial Hygiene Foundation, Pittsburgh, November 18, 1953.

President's Page

THE relative prominence and influence of an organization is determined chiefly by its size. Its strength of character and quality of accomplishment, however, depend primarily upon the sustained interest and support of its membership. A small group, whose members work energetically toward common objectives, generally is more successful in attaining those objectives than is a larger group wherein an atmosphere of apathy prevails. No organization can realize its full potential unless the factors both of size and membership interest are present.

After a period of 23 years in which the total membership never exceeded 500, the Industrial Medical Association has experienced a fairly rapid growth within the past 15 years. The chart appearing on page 433 of the October Anniversary Issue of *Industrial Medicine and Surgery* graphically illustrates this steady increment in membership from about 500 in 1938 to approximately 2900 in October, 1953.

This increase undoubtedly has been due to a number of factors. The growth of industry, complemented by the realization of management and labor of the importance of industrial health services, has resulted in more opportunities for physicians to enter this type of practice either on a full-time or part-time basis. As the Association has grown, it has attained increasing prominence in general medical circles and thus has come to the attention of more physicians than in the past. The activities of the District Counselors and the Membership Committee in contacting and interesting prospective members in joining our Association have been another important factor in the Association's continued growth. However, in spite of this growth, the present membership of the Association represents only a small portion of the total number of physicians engaged in this type of practice. Undoubtedly, many such nonmember physicians still are unaware of the Industrial Medical Association, or the reasons for its existence. Others, through lack of proper information, mistakenly consider themselves ineligible for membership. The Association's District Counselors can cite numerous examples in both of these categories.

In spite of their diligent efforts, the Counselors comprise a relatively small group of men with neither the time nor the opportunity to "beat the bushes" throughout their respective districts. The existing members of the Association, however, are reasonably well dispersed among the industrial communities of the nation and it seems reasonable to assume that every present member is acquainted with at least one other physician who is eligible for membership in the Association. As our immediate Past-President, Dr. Irvin, so aptly pointed out last year, if every existing IMA member would make the relatively minor effort of interesting one non-member professional acquaintance in joining the Association, the organization could double in size practically overnight. This, indeed, is one simple way in which every current member can demonstrate an active interest in and at the same time increase the size and strength of the Association. Consequently, I urge that every member make an effort to interest one physician in joining the Industrial Medical Association. Opposite page 44 is an appropriate form for the purpose. The names and addresses of the respective District Counselors to whom this form should be directed appear on the reverse side.

THERE are a variety of other methods by which members can contribute active support to the Association. It is the duty and the privilege of the Officers and Directors to conduct the affairs of the Association in accordance with the wishes of the majority of the membership. The most effective manner in which these wishes can be registered is by attendance at and participation in the Annual Meetings of the Association, and by attendance at the regular meetings of the respective component societies. Members can and should demonstrate their interest in the Association by a willingness to serve in its behalf as committeemen, District Counselors, or any other reasonable assignment that may be offered to them. Members also can advance the interests of the Association by contributing constructive suggestions. Such suggestions should be in writing and preferably should be transmitted either through the appropriate District Counselor or component society. Silent or locally-voiced criticism is apt to be of little value, since such criticism never comes to the attention of the Association's Directors.

George F. Wilkins M.D.

President,
INDUSTRIAL MEDICAL ASSOCIATION

Association News

1954 Industrial Health Conference

THE preliminary program for the 1954 INDUSTRIAL HEALTH CONFERENCE, April 24-30, at Hotel Sherman, Chicago, has been completed, and some 40,000 copies of it will be in the mail during January. The six participating organizations are: INDUSTRIAL MEDICAL ASSOCIATION (39th Annual Meeting); AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (16th Annual Meeting); AMERICAN INDUSTRIAL HYGIENE ASSOCIATION (15th Annual Meeting); AMERICAN ASSOCIATION OF INDUSTRIAL NURSES (12th Annual Meeting); AMERICAN ASSOCIATION OF INDUSTRIAL DENTISTS (11th Annual Meeting); UNITED STATES NAVY INDUSTRIAL HEALTH ORGANIZATION (6th Annual Meeting). All the Associations have separate programs, with joint meetings of two or more of the groups occurring at intervals. There are to be 115 formal presentations, five panel discussions, numerous luncheon conferences, three banquets, and many committee meetings. A continuing feature throughout the whole seven days will be the "Technical Guidance Clinic," described elsewhere in these pages. Among the subjects of special interest, to be dealt with in a succession of several presentations, are the following: industrial hygiene instrumentation, health education, air pollution, radiation hazards, disaster control, lung cancer, new toxicities and the place of tobacco in the etiology of lung cancer. The DONALD E. CUMMINGS MEMORIAL LECTURE will be given by FRANK A. PATTY, Industrial Hygiene Department, General Motors Corporation, Detroit, at the AIHA Banquet, Thursday evening, April 29. The Annual Banquet of the INDUSTRIAL MEDICAL ASSOCIATION will be held at 7:00 P.M., Wednesday, April 28, and the AAIN banquet at 7:30 P.M., Thursday, April 29. More than a hundred Technical Exhibits will acquaint the alert industrial physician with all the latest developments in products and equipment that will aid him in his work.

Railway Surgeons

AMERICAN ASSOCIATION OF RAILWAY SURGEONS is holding its 66th Annual Meeting, April 6-8, 1954, at the Drake Hotel, Chicago. The Program Committee is about ready to announce an unusual number of interesting papers on medical and surgical subjects; and the number of technical exhibits, many of them new, is already exceeding expectations.

University of Michigan's Fifth Discussional

THE "Discussionals" inaugurated by the University of Michigan's School of Public Health and its Institute of Industrial Health in 1949 already have become a tradition. These Discussionals were designed as a forum for informal discussions among Medical Directors and those in allied fields for appraising current occupational health situations, and for anticipating newer requirements for months just ahead. The discussions and exchanges of experiences have been conducted without the formality of prepared papers, and without any record of what was said or who said it. The topics of spontaneous expression might have been anything. In reviewing this Fifth Discussional, it may be realized that the coverage was almost everything. Altogether it was an unprogrammed program. It is a paradox that perhaps the most important and most publishable contributions of Industrial Medical Directors appear in sessions without reporters and generally without restraint. The greatest single cause of aphasia among Industrial Medical Directors is the presence of a stenotyper.

Shorn of all such impediment, free discussions at the Fifth Discussional, December 11-12, 1953, were devoted to a board status for qualified industrial physicians, physical examinations for executives, toxic substances newly introduced into industry, evidences of tremendous concern in occupational health by industrial management, practical programs for small plants, the significance to industry of non-occupational accidents and illnesses, utilization of governmental agencies in industrial hygiene, and industrial hygiene provisions for the small plant.

Participation in the Ann Arbor Discussionals is on an invitational basis, the desire being to keep the group small. Approximately 50 Medical Directors and Industrial Hygienists shared in the latest of these unrecorded appraisals. It is fruitless to speculate as to which assemblages of physicians are most influential in creating the guiding principles that attend the programs of occupational health. So conceding, it is impossible to disregard the consensus annually achieved in the Ann Arbor meetings.

Letters

Chronic Carbon Monoxide Poisoning

TO THE EDITOR: In an editorial in the September, 1952, issue of *Industrial Medicine and Surgery* which has only recently come to my notice the existence of the syndrome of chronic carbon monoxide poisoning is disputed.

As I have published a monograph[1] on this subject, in 1949, after extensive study, I should like to make some comments on the views expressed in your editorial.

1. I agree with you that chronic carbon monoxide should be distinguished from the sequelae of acute poisoning, (a) for prognostic reasons, (b) because chronic poisoning may occur unpreceded by acute poisoning, and (c) because it has been demonstrated by animal experiments that chronic changes can be induced by exposure to low concentrations of carbon monoxide.

2. The editorial maintains that the so-called cases of chronic carbon monoxide are in fact victims of chronic exposure, not chronic poisoning from a single exposure.

It is difficult to accept the definition of a chronic disease as due to a single exposure. This is certainly not the case in chronic alcoholism, nor in chronic lead poisoning; in fact, it would only be valid in the case of a single exposure to a poison with a very slow resorption, i.e., the definition would have a very limited application.

3. The editorial, by maintaining that the syndrome is merely due to chronic exposure, identifies the syndrome with recurrent acute (subacute) poisoning.

The two syndromes are, however, essentially different. In the case of recurrent poisoning, the symptoms closely accompany the exposure (the work) and disappear in a short time. In the case of chronic

1. Chronic Carbon Monoxide Poisoning. Copenhagen, 1949, 229 pp.

carbon monoxide poisoning the symptoms do not appear until exposure has occurred for a considerable period and may last for some months after cessation of exposure. True, acute poisoning recurring over a long period usually leads to chronic carbon monoxide poisoning and the distinction may thus be impossible, but this does not alter the fact that a difference exists.

4. The editorial seems to agree that a syndrome exists due to chronic exposure. No one who has examined drivers in a country where producer-gas automobiles are prevalent would venture to deny that this syndrome exists as a separate entity and consequently deserves a separate name. If, for puristic reasons, you refuse to use the word "chronic," you owe us a name for the syndrome developing in a characteristic manner following moderate exposures to carbon monoxide for some length of time, irrespective of whether these moderate exposures produce symptoms at the time of exposure.

5. I agree with you that much confusion has arisen in the literature and in practice by the lighthearted diagnosis of chronic carbon monoxide poisoning. In cases here practically every conceivable symptom was attributed to an exposure to carbon monoxide which was often merely presumed, and not ascertained.

But the confusion is not eliminated by denying the existence of a disease because the diagnosis has been abused.

—Aage Grut, M.D., Occupational Health Adviser, International Labour Office, Geneva, Switzerland.

Books

The Hand

Functional and Surgical Anatomy of the Hand: Emanuel B. Kaplan, M.D., F.A.C.S. J. B. Lippincott Company, Philadelphia, 1953.

The intricate anatomy of the hand has interested surgeons and anatomists for centuries and each one who has approached it in the spirit of a humble student has come away with a feeling of awe and respect. Sir Charles Bell in the early 19th Century contributed the Fourth Bridgewater Treatise on the general thesis of, "The Power, Wisdom and Goodness of God, as Manifested in Creation." His treatise was entitled, "The Hand—Its Mechanism and Vital Endowments as Evincing Design." It is somewhat surprising and at the same time refreshing that an author in the 20th Century, long after the battle of evolution has been fought and in view of the mechanistic and practical teaching of today, should again read intention into nature. It is indeed difficult to conceive of the intricate mechanism of the human hand without at least the thought of design or intention cropping up in its development. This feeling of respect and admiration of the mechanism of the hand pervades in a way the whole of Kaplan's book, and it is this thread which lends coherence to it. It must not be thought that this is a book on metaphysics or philosophy—far from it—it is a good solid and basic text of anatomy and surgical anatomy, beautifully illustrated, thoroughly founded and carried through. It is an invaluable source book for the surgeon interested in the surgical treatment of conditions of the hand. But in a way it is more than just that. Kaplan's descriptions give one an insight into the whole inter-related and integrated mechanism of this important end-organ, the hand, and into the complexity of organization which characterizes all living structures.

An excellent chapter on the hand as an organ is followed by a series of chapters dealing with the anatomy of the various parts of the hand, another series of chapters on the blood, nerve and retinacular systems, and a long and important chapter on the mechanism of action. These chapters are all thought provoking and stimulating, and one feels that a whole phase of surgery has been illuminated, tempting one on to further study. Some 50-odd pages on surgical anatomy again open up paths which promise much for exploration.

This is the book of a scholar and a philosopher dealing with a topic seldom thought to lie within these realms. To those who wish factual knowledge of anatomy the book has this to offer and in excellent description and illustration. To the surgeon dealing with the problems of reconstruction of the hand the book gives much food for thought and implied directions, and indicated paths. It is not a book for the casual or hasty reader, although much exact and detailed information is given which would be helpful even on hasty review.

While on a few points on anatomic details one may differ with Dr. Kaplan (particularly in the chapter dealing with retinacula and fascias) these points of difference are largely a matter of interpretation rather than observation, and do not detract from the fundamental character of the book. It is a text which will never grow old or out of date, and in the opinion of the reviewer will rank as one of the source books in surgery.

—Michael L. Mason, M.D.

The Heart

To Live and to Work. 1952 Annual Report, American Heart Association, 44 E. 23rd St., New York, pp. 36.

Time was—and not too far gone—when the annual report of any national medical body would approach as to aridity the contents of a recently cooled lime kiln. There might appear a listing of officers and directors, a tiresome recital of financial affairs, a roster of the year's donators, a blank for the making of future gifts, a further blank bespeaking the inclusion of that association in the bequests of wills, cheerfully hopeful that the wealthy aged might not survive the ravages of that very disease to the elimination of which the association is dedicated—nothing informative or appealing.

Not so for the annual report of the American Heart Association. This looks like it has fallen into the benign clutches of the public relations boys assisted by clever copy writers. That's all to the good, and more power to them. The current report is as crisp as the current issue of any news weekly or the newest output of any literary digest. Here are a few random paragraphs:

"Are we winning the war against heart disease? That is what the public wants to know as we intensify our struggle against the greatest health challenge of this era.

"The very fact that this question is now so prominent in the mind of the public indicates that one major goal is being achieved. Our vital cause is arousing keen interest and extraordinary dedication on the part of lay and professional citizens alike. This is rapidly replacing the former attitude based on fear, ignorance, and indifference.

"The phrase—to live and to work—does not refer to work in an economic sense alone, but also in a personal and social sense. Our community serv-

ice and educational efforts are aimed to help the heart patient maintain his dignity and value as a human being.

"Alert business and labor groups have given increasing support to help cope with these diseases that deplete the trained and skilled supply of workers and strike a deadly blow at the core of industrial management at the peak of executive capacity. Heart disease—especially coronary heart disease responsible for the majority of 'heart attacks'—has taken an alarming toll among the men and women who formulate and execute the plans and policies of business and government, often cutting them down as they enter the greatest period of their potential contribution to our civilization.

"An inspiring example of the fruits of research is presented in the opening section of this report, in which the role of the Association in the rheumatic fever preventive program is outlined. In a move hailed as a 'milestone in health progress,' the Association has taken national leadership in starting a broad campaign to achieve widespread use of approved preventive measures that will save countless lives and lessen disability both in the younger and middle age groups."

You want to know more? Then write for a free copy to the address above supplied.

P.S. There still remains that sacred prerogative—the mention of memorial gifts, legacies and bequests—"I give and bequeath" etc. Not yet have I changed my will. Who knows? If the appeal be made any more fetching, maybe yet I shall!

Song of the Scales

OVEREATING, OVERWEIGHT AND OBESITY. Nutrition Symposium Series, No. 6, The National Vitamin Foundation, Inc. New York, 1953, $1.50.

This thin book bears down with the weight of the Alps on that not too concave bodily part upon which it rests in the process of reading, but it is a balm to the ratiocinating head. Who am I to condemn the Bible, and that I do not do. But the Psalmist would have served all mankind if he (without disturbing his poetic meter) had substituted "lean" for "meek" in indicating just who was going to inherit the earth. David further might still have remained in the realm of the factual had he added to Psalm 37 or anywhere else this footnote—"The lean shall bury his peers and become the last survivor." Since this omission may not be rectified, this book becomes a necessity, shouting as it does in stark scientific pronouncements, "Obesity is no laughing matter"—"Obesity is unnecessary"—"Obesity is but the badge of oral indulgence." In 10 practical papers, not actually directed to the spreading ones, but suitably written (save one chapter) for their reading, earnest authors get right down to the last fatty pound and how to avoid it. Here is a non-fat producing taste of the whole. Persuasion must convince the obese one, as to obesity, that:

"1. It can result only from overeating.
2. It can be corrected only by rigid dieting.
3. He will be hungry all the time but not abnormally so.
4. He should be hungry most of the time as this is normal.
5. Physiologic hunger must be differentiated from the memory of the fun of eating—gustatory sensualism.
6. Several glasses of water, which may be taken as desired, will control physiologic hunger for several hours but will, of course, do nothing for gustatory sensualism.
7. All he eats does not turn to fat but that his vital tissues take first all the nutriment they need and only that eaten in excess of this is converted into and deposited as fat.
8. The diet prescribed will adequately nourish his vital tissues and not weaken him because weight loss will be by depletion of fat alone.
9. Disturbances of endocrine gland function, such as dysmenorrhea, associated with obesity are almost always secondary to the faulty eating rather than a primary disorder and may well be expected to be relieved by cure of the obese state, and no other treatment is indicated.
10. When endocrine disturbance associated with obesity is primary, treatment of it alone will not influence obesity.
11. The obesity can be corrected only by a negative energy balance, i.e., a daily caloric deficit."

If you annoy your own scales, get this book. Reading it will not reduce weight unless transformed into negative calories.

The Teeth and Occupational Diseases

ORAL MANIFESTATIONS OF OCCUPATIONAL ORIGIN: F. J. WALTERS; J. W. FRIDL; RAYMOND L. NELSON; JON W. TROST: Public Health Bibliography Series No. 7, Federal Security Agency, Public Health Service, Division of Occupational Health, Washington, D.C., 1952, pp. 41, 20 cents.

Possibly all investigative work is to be condemned. Possibly it is true that what you don't know won't hurt you. Possibly sleeping dogs always should be allowed to lie. At any rate, until recently there was little concern and little reason for concern over any probability that occupational diseases to any significant extent involved the teeth and other oral tissues. Then the dentists, in and out of the United States Public Health Service, physicians, and others began to pry into mouths. What they found removed all complacency. Oral involvement is commonplace in occupational disease. This booklet represents an abstract compilation of 138 publications revealing oral manifestations in disturbances of occupational origin. Just for example, tartaric acid enters bakery goods of European countries far more than is true for the United States. It is established beyond peradventure that the teeth of bakery workers, across the Atlantic, are notoriously in bad state, or even worse—no teeth. It appears possible that tartaric acid dusts in bakery workshops may be responsible for, or at least contribute to, this dental destruction. This one citation reveals the trend of all the other abstracted items.

Diseases of the Eye

MAY'S MANUAL OF DISEASES OF THE EYE: 21st Edition: Edited by CHARLES A. PERERA, M.D. Williams & Wilkins, Baltimore, 1953, p. 512, $6.00.

Hail to an old friend! Individuals are given to celebrating the arrival of their twenty-first birth anniversary. The majority of books are long forgotten by the time of the twenty-first year after publication. Here is a book that has achieved the amazing and almost the unbelievable—its twenty-first edition. This perhaps sets no record but still is remarkable. Since 1900 this book in its various editions has served as the ophthalmological spouse of 52 lots of medical students, many of whom remember May's as the very symbol of their medical education. Through all the years following student training this book has served as the faithful companion in the decades of medical practice. Modestly the jacket in these words mentions this twenty-first edition:

"This classic text on diseases of the eye, written primarily for medical students and general practitioners, first appeared in 1900. Since then, its ever-growing popularity has made it the best-selling medical book of all time. In addition to the 21 American editions, there have been 10 German and 11 Spanish editions, as well as translations into nine foreign languages—including Chinese, Japanese, and Urdu.

"Through all these editions and translations, May's manual has remained true to its original purpose: it is still a compact and exact guide to all the diseases of the eye and its adnexa."

At its beginning this book was valuable. It continues to be valuable.

When?

WHEN SHOULD A WORKER BE RETIRED?: RON STEVER. Management Report No. 170, Research Division, California Personnel Management Association, Berkeley, California, 1953, p. 11, $1.00.

It is now apparent that grievous errors were introduced just a few years ago in adamant plans for the compulsory retirement of nearly all workers at a fixed and relatively early age. This misconception has led to a lot of backing and filling and readjustments. Some harm has been done, and some of this harm is irreparable. All of this is faced in this pamphlet, with the presentation of all sides, together with due consideration for the impact of the amazing lot of fringe benefits that have crept into the income of workers as workers and workers as retirees. The author does not quite say so, but it appears that the time for a worker to be retired is when no longer he may make a contribution to industry helpful and satisfying to himself and helpful to industry.

Adjustment to Living

LIVING WITH A DISABILITY: HOWARD A. RUSK, M.D. The Blakiston Company, New York, 1953, p. 207, $3.50.

This is a book of "gadgets"—gadgets for the disabled—gadgets in adjustment to living. The author, Dr. Rusk, may be a mite outraged over the emphasis on gadgets, but there his own emphasis is, for he writes:

"The 'gadget era' has particular implications for the person with a physical limitation who has lost all or a part of his ability to perform various functions. Such aids as the wheel chair, crutches, and prosthetic limbs have been used for years, but new materials, new designs, improved engineering, and modern methods in prescribing and giving training in their use have greatly increased their functional value.

"Similarly, new materials, designs, and engineering techniques have made possible a host of new aids. Even more important than the mechanical aspects of the use of such aids is the human aspect. More and more we are adopting individually and socially the modern concept based on experience that 'people are people,' but that they all have individual differences. Some of these differences are of slight degree, others are of greater degree, but regardless of their degree of difference, all people are basically the same and all people can live lives of dignity within the limits of their disabilities."

This book is beautifully illustrated with photographs. Everything is there but the "runcible spoon" —the spoon that is a combination of fork and spoon with possibly a cutting edge as an added facility. Even the runcible spoon is there but is not so called.

There is no restriction to just a few gadgets, but entire kitchen lots of them and entire bedrooms, and with no neglect of sports gadgets. The purport of the book runs not so much to gadgets for resumption of work as to gadgets for the home living of the disabled. Still, the work gadgets are not ignored.

Long the industrial physician has been irritated over endless philosophic discussions of rehabilitation, security for the disabled, the mental state of the handicapped. He need fret no more for here, right down to the last modified knitting needle, everything is practical. So thoroughly so that the word "disabled" and the fact of "disability" for many handicapped persons may be ignored.

Science Miniature

Hydrazine

CAREY P. McCORD, M.D.

THE toxicity of hydrazine has been investigated and its injurious properties are known to be outstanding. Organic hydrazine derivatives have been explored as to toxicity and many have proved to be detrimental. However, toxicity of hydrazine in combination with inorganic substances little has been the object of inquiry. In recent months, it has been disclosed that, in soldering operations, the use of hydrazine hydrobromide and hydrochloride as a flux possesses technical advantages. Reason exists to believe that such is not without some potential risk of damage to solderers. Although this flux is applied only in a 2% aqueous solution, it is obvious that, under the heat of the soldering operation, evaporation of water readily is brought about and with it spattering of the solution and, eventually, the thermal decomposition of the hydrazine hydrochloride or other salts so applied. The thermal decomposition products chiefly may be hydrazine, so that foremostly the newer situation resolves into the older one, the toxicity of hydrazine itself. It is known that hydrazine hydrobromide is capable of inducing a significant dermatitis, that hydrazine on a systemic basis acts unfavorably on carbohydrate metabolism, the blood and perhaps blood-forming organs, and otherwise the liver may be the site of damage. All of this and more is set forth in the two publications below cited.[1,2] At the present time no full body of information on the toxicity of hydrazine hydrobromide and hydrazine hydrochloride exists. Enough is known to warrant extensive laboratory examination, and such investigative work is in order and is expectable.

Citations

1. "Acute and Sub-Acute Inhalation Toxicity of Hydrazine Vapors to Rats." MCGRATH, F. P., COMSTOCK, C. C., and OBERST, F. W., Chemical Corps Medical Laboratories, Army Medical Center, Maryland. Federation Proceedings, 11 (1):374, 1952.

2. "Properties, Production and Uses of Hydrazine." TROYAN, J. E., in *Industrial and Engineering Chemistry*, Vol. 45, page 2608, 1953.

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Medical Research and Private Enterprise

THE RECENT publicity (*Time*, November 30, 1953) given to lung cancer and its possible relationship to smoking should make all physicians pause and review the present status of this problem. Certain it is that lung cancer is on the increase, particularly in males between 45 and 70. This is a real increase, and not simply due to better diagnosis. It is, further, not alone due to the increasing age of our population, since it has not been observed in anything like the same degree in women as in men. Whenever any disease begins to show an increase comparable to that shown by lung cancer, the medical profession begins searching inquiries in the hope that the causative agent or agents will be uncovered and the pathway to prevention therapy made clear.

Such inquiries begin with the patient in the hope that some common factor may be found in the history which will offer promise if pursued. Astute clinical observers such as Dr. Ochsner and Dr. Graham have long held the "clinical impression" that a large majority of the lung cancer cases they have seen were heavy smokers. Wynder and his associates have merely translated this "clinical impression" into a statistical analysis. Such an analysis reveals that of patients with lung cancer there are far fewer non-smokers and far more heavy smokers than in a comparable series of patients with some disease other than lung cancer. The majority of investigators who have repeated such analyses in various parts of the world have confirmed these results, although a few such analyses have not confirmed them.

In any event, the weight of evidence shows that some relationship exists between the heavy smoking of cigarettes for prolonged periods (20 years more or less) and lung cancer in the male. Why this relationship does not exist in women is explained on the basis that cigarette smoking was socially unacceptable for women until a few years ago. Why this relationship does not exist for cigar and pipe smoking is explained on the basis that the smoke from a cigar or pipe is not often inhaled, while cigarette smoke generally is.

Whether or not the relationship between cigarette smoking and lung cancer is a cause and effect relationship has not been proved. It has been established that tar collected from a cigarette smoking machine contains something that causes tumor and cancer formation in the skin of the mouse when this tar is repeatedly painted onto the skin of the mouse. In view of this positive evidence, the burden of proof rests on those who say cigarette tar does not contain a mouse skin carcinogen. Was the effort to produce such tumors persistent enough and prolonged enough? The only way to answer this question is to submit the data which says cigarette tar does not contain a mouse skin carcinogen to detailed and critical analysis.

What relationship exists between skin carcinogenesis in the mouse and lung carcinogenesis in the human, if any, has yet to be determined. This is a field which warrants much intensive research in the immediate future.

It is unfortunate that the tobacco industry seems to have chosen a negative rather than a positive approach to this distressing medical problem (*Time*, December 7, 1953). It is apparent that its spokesman did not receive sound medical advice prior to the quotations attributed to him. This again reemphasizes the need of industrial management's receiving the most competent medical advice available before making

public pronouncements on medical subjects. Drs. Ochsner, Graham and Wynder certainly have no cause for prejudice in their investigations and pronouncements. The tobacco industry, on the other hand, certainly has such cause, though it is not the intent here to imply that it is so prejudiced. If the tobacco industry has sound scientific investigations which refute the association between cigarette smoking and lung cancer, then now is the time for it to report this work in detail so that it may be carefully analyzed. The names of the investigators should be made known, and the details of their experiments made available.

Rather than a negative approach to this problem, the tobacco industry should display its good faith to the American public by appointing competent medical research advisers to their staffs who can plan, carry out, interpret, and make sound recommendations for the solution of any problems which may arise out of such research. They should take a positive approach to the problem in the best interest of their consuming public, guided always by sound medical advice.

Certain large corporations (*Time*, November 30, 1953; Page *et al*, *Archives of Industrial Hygiene & Occupational Health*, October, 1951) have had accredited success by this approach. It is hoped that all competitive enterprise will follow their example. If not, uncontrolled governmental intervention may be anticipated (Weaver, *New York Times*, December 21, 1953).

—Robert Collier Page, M.D.

A Threat to Physicians

Insane persons are sick persons. Long before institutional care is arranged, these lunatics ordinarily are observed professionally by the family physician or the psychiatrist in private practice. Deep resentment and hostility often arise so that every physician at any time might become the victim of violence at their hands.

Dr. Edward Spalding, Detroit's distinguished cardiologist, consultant to industry, and sponsor of good industrial medicine, was slain by a madman. Dr. Spalding never saw his assailant; never was he the doctor's patient. The distorted mind mistook him for one of 11 victims marked for retaliation because of imagined wronga. Far earlier this lunatic had been under institutional observation for mental aberrancy. There is every willingness to recognize that mental hospital beds are all too few. There may be good reason to discharge from a hospital those who apparently have attained some degree of stability in order that more violent ones may be accepted as a safeguard for the public. The limitations that necessarily attend the diagnosis of mental disorders fully are respected. Still, withal, is it too much to hope that the day will come when better psychiatry will be able to predict with fair certainty the future behavior of mental deviates, once they have been under institutional scrutiny?

Dr. Edward Spalding is dead; his usefulness is over—his good mind and body destroyed by a wasted and useless mind. There is small comfort for anyone in the madman's foolish statement, "I must have killed the wrong man."

Technical Steering Service

Under the tentative caption "Guidance Clinic" earlier comment was made in this Journal with respect to an opportunity for the various Associations that constitute the Industrial Health Conference to increase its value to their memberships. Long it has been realized that many of those in attendance are confronted with difficulties within their own personal activities but find no guidance from prepared programs. It was proposed that an informal panel be available during the Chicago sessions which will consider any inquiries sent in, or brought in, and generally will seek to indicate to the inquirer the solution of his perplexity or to steer him to proper sources.

This plan has been officially approved and further planning is under way. Later this Journal will announce the committee. Suitable space will be set aside in the hotel headquarters, and suitable notices will appear in the program.

In an effort to test the need for this enterprise, personal inquiries have been made of a number of physicians as to what sort of question might be asked by them if then and there the committee or panel were functioning. A few of their questions typify the anticipated trend:

1. To what extent may the determinations of porphyrins in urine be accepted as a suitable screening procedure for groups of workers exposed to lead dust?

2. Does cork dust as inhaled by workmen ever lead to significant injury?

3. Why does I.M.A., or some other official group, not maintain some form of personnel placement activity serving alike employers and applicants?

4. To what extent should industrial nurses qualify for industrial hygiene work in small plants where they are the sole medical representatives?

These are but random questions but they appear to reflect need on the part of large numbers of those who work in the occupational health field. Nearly all such inquiries are susceptible to ready reply but on occasion might call for referral to individuals not on the panel or to require delay until some designated panel member might have access to published items.

All inquiries will be treated confidentially; no records will be maintained except as to the num-

bers of inquiries made, the Association of which the inquirer is a member, etc. Only enough tabulation will be prepared as may guide the Associations in the perpetuation of this innovation.

At the time of the Conference any member of any group, personally or by memorandum, may present any technical problem to the committee secretary always on duty. Immediately, or shortly thereafter, such information as is available will be provided or the inquirer will be brought in touch with other individuals known to be qualified to provide suitable steering service. Until the time of the Conference, inquiries by letter may be directed to: Carey P. McCord, M.D., Institute of Industrial Health, University Hospital, Ann Arbor, Michigan.

Hiatus in Preventive Medicine

THE medical profession from time to time has viewed with understandable pride the gains made during the first half of the century in the fight against infectious disease in man. Progress is graphically measured in the almost unbelievable 20-year extension of life expectancy at birth in citizens of this continent since 1900. This has been brought about through such devices as protection of our food and water supplies, as in controlling typhoid fever; immunization of our children against diseases amenable to that procedure; and the application of potent chemotherapeutic and antibiotic agents in such infections as pneumonia and syphilis.

One result of the progress against infectious disease is a growing awareness of the problem of "degenerative disease." There our record leaves much to be desired. While we bemoan the dearth of information on such disorders affecting our patients of middle age and beyond, we are failing signally in our attempts to control a well-recognized and wholly controllable causative agent in the illness of many of these patients—that of obesity!

In some industrial groups, as many as one in four workers are known to be 20 or more pounds above their optimum weight. Obesity is a disorder the proximate cause of which is well-established —overeating! Its association with increased death rates from cardiac, vascular and renal disease, diabetes, disease of the liver and gallbladder, and the like, is equally well-known to us. Instructions for weight reduction are simple, widely available, and require no unusual intelligence to be understood by the patient. Why are we not doing better in this field of preventive medicine which could yield rich returns?

The attitude of the profession toward excess body weight has not been as aggressive as it has been toward other known causes of disease. Many physicians are themselves undesirably obese. Many patients, equally cognizant of the facts of life in this regard, are unwilling to continue a dietary program which they know to be beneficial for them. Habits of overeating are often instilled in childhood or acquired during periods of larger than usual energy output in early adult life. Furthermore, vast numbers of our fellow citizens have emotional disturbances, dissatisfactions, cravings for love, and unfulfilled sexual desires which lead them to overeat. One is led to believe that the feeling "it can't happen to me," or "I'm different—I'm supposed to weigh more since my grandfather was a fat man," are rationalizations which are potent deterrents to dietary preventive medicine on the part of many.

While agencies can be created to control the purity of food and water, to provide immunizations for some diseases, and to develop chemical and surgical procedures for others, the unneeded food we eat is our own doing as individuals, leading too often to our undoing. We need new techniques in prevention of disease by the individual. The problem is one of human motivation. Are we doing all that we should be doing in this regard for our associates in industry?

The Brookings Institution (Health Resources in the United States) described the returns from a survey of 507 industrial plants on the use of seven health education media. These are the well-known ones: personal counseling, pamphlets, articles in house organs, posters, group talks, movies, sound slides. About half of the plants were said to use three or four of them; 31 plants used none; only 16 reported the use of all seven. How many does my plant use? Am I using these health education media intelligently and with emphasis on the maintenance of optimum health? What new methods can I find which promise to be effective in influencing the worker to follow a wholesome nutritional program?

The busy physicians must both instruct and stimulate the overweight men and women to do for themselves what they alone can do. Let us accept obesity as a major problem in industrial groups, find better techniques of motivation, and do what clearly lies at hand for the avoidance of the ravages of degenerative disease while we await that biochemical knowledge which lies dimly ahead.

From 1809 until 1816, "The Society for Promoting Vaccination" was active in Philadelphia in the effort to convince the residents that they should be vaccinated against smallpox. Has the time come for a new group, "The Society for the Prevention of Obesity?" It may even be foreseen that any member in good standing of that society would come day or night to hold the hand and support the wavering will of one who wrestles with an intolerable craving for unneeded food.

—LEMUEL C. MCGEE, M.D.

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Vomiting	4	3

Of the 36 patients with symptoms referable to their carcinoma, a total of 87% experienced symptomatic improvement under Neodrol therapy.

Escher, G. C., et al.: Clinical Research Proceedings 1:51 (Apr.)

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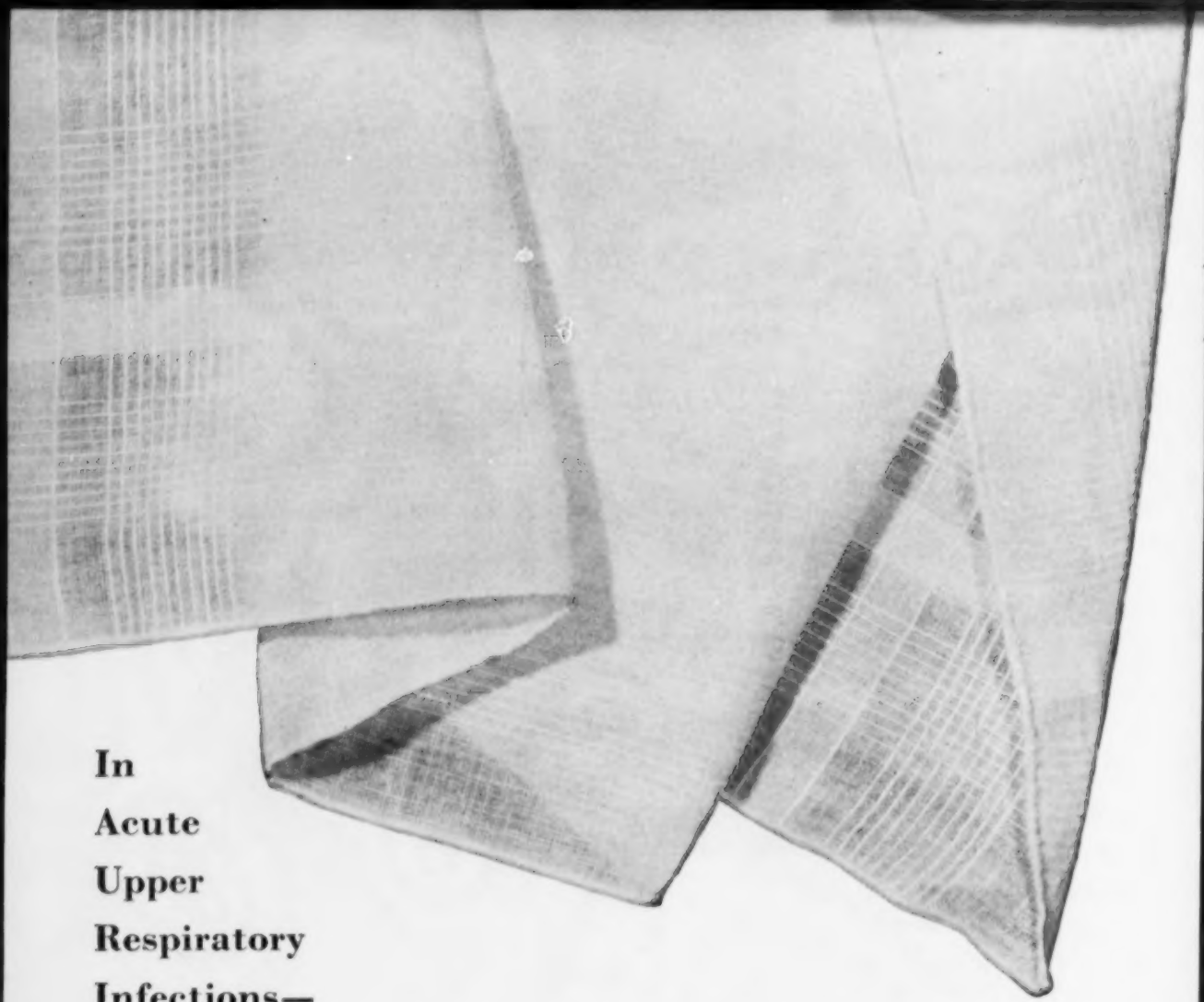

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News, Comment, Opinion

WHAT are they good for?" asked Prime Minister Gladstone when Michael Faraday explained his electric discoveries to him. Replied Faraday, "Some day you'll tax them!"

—*The York Report*, December, 1953.

Mental and Emotional

MENTAL and emotional disturbances afflict 20-25% of the nation's workers, according to Dr. George S. Stevenson, Medical Director of the National Association for Mental Health. These disturbances range, he said, from psychoses to industrial maladjustment and show up in impaired efficiency, accident proneness, chronic absenteeism, personality clashes, habitual infraction of rules.

—*Personnel Executives' Newsletter*, November 16, 1953.

Their Normal Job

IN AN ARTICLE, I published in *National Safety News*, February, 1953, I described in some detail two experiments which were carried out in our organization, wherein two separate groups of several hundred individuals who had turned in a very poor safety performance changed, almost overnight, into areas of outstanding safety performance when the head of the unit demanded, safe producctive work, and insisted that other forms of evasion of responsibility be stopped. In addition to the improvement in the safety record of these groups, there was much evidence of improved morale and mental health generally. I advocate only the practice of sound principles of mental hygiene by all people in the same way that I, as a physician, advocate the practice of sound principles of physical hygiene and sanitation. These principles apply with equal effectiveness to all levels of society and industry. Top management must do their *normal* job; the janitors must do their *normal* job.

—From "Safety from the Standpoint of the Psychiatrist," by GERALD GORDON, M.D., Medical Division, E. I. du Pont de Nemours & Company, Forty-First National Safety Congress, Chicago, October 19-23, 1953.

Group Coverage

SPOKESMEN for United Air Lines, Upjohn Company and Ohio Oil Company recounted their various experiences with group coverage of employees. Their joint conclusion: Highly satisfactory. United is spending an annual sum for insurance protection that is equivalent to value of its entire plane fleet of only a decade ago. Upjohn, with an average of 4,000 employees since its plan was launched almost three years ago, is thinking of adding catastrophic medical insurance. The Ohio Oil Company plan, though in effect less than a year, shows promise of working out quite successfully, it was testified.

—*Washington Report on the Medical Sciences*, October 19, 1953, re House Health Committee's national health hearings.

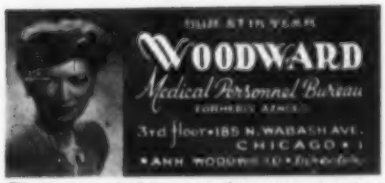
Relax

ONE of the great philosophers of our day is Satchel Paige, a famous colored baseball pitcher who has been with the St. Louis American League team for the past few years. Satchel's specialty is filling in the breach for pitchers who get in trouble. He is probably unequalled as a relief pitcher. *Collier's* a few months ago carried an interesting story of the life of Satchel Paige and wound up with a brief statement summarizing Satchel's philosophy. It has been read by many and copied many times but probably should be framed and hung on the wall in every personnel office. It is: (1) Avoid fried meats which angry up the blood. (2) If your stomach disputes you, lie down and pacify it with cool thoughts. (3) Keep the juices flowing by jangling around gently as you move. (4) Go very lightly on the vices, such as carrying on in society. The social ramble ain't restful. (5) Avoid running at all times. (6) Don't look back. Something might be gaining on you.

—*Personnel Journal*, November, 1953.

That Coffee Break

IT WASN'T too long ago that the average employee was willing to work for three square meals a day. Today he wants money for the three meals and time for one or two coffee breaks. No longer is he willing to waste company time standing by the water fountain. Now he wants to be served coffee while he's wasting company time standing at the water fountain. The coffee break has given



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Medical Director: (209) Well seasoned in industrial medicine; one of leaders in this field; well-experienced in petro-chemicals, and toxicological problems; past 14 years, assistant medical director, important company; one of largest in its field; now ready for directorship; only large company and program; middle 40's.

Medical Director: (210) M.A., Medicine, Ph.D., M.D., leading school; past four years, associate professor, industrial medicine, important university medical school; toxicologist, 1000-bed city hospital and consultant, industrial medicine, major company; seeks full time directorship, industrial medicine, hygiene, with leading company; $15-$20,000; middle 30's.

Staff Physician: (211) Class "A" graduate; eight years, successful private general and surgical practice; four years, staff physician, large state college; prefers industrial medicine; well-qualified man for an assistant to busy industrial medical director; middle 40's.

Staff Physician: (212) Class "A" graduate; five years, Major, USAMC; several years, residency, medicine; has been, for two years, physician in large semi-heavy metal manufacturing plant; seeks post leading to medical directorship, reliable, serious, hard worker, cooperative and willing to take direction; age, 31.

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a fuller life to the office clock watcher. Now he can watch for noon, 5:00 o'clock, and the 10:30 coffee break. Nothing—but nothing—is more touching than the habitually late employee who overshoots his mark and arrives at the office too late to go out for morning coffee.

—From "Who Gets the Coffee Break?" by HENRY T. FAGAN, in *Buildings*, April, 1953.

Deafness—Occupational

LAST year, the Wisconsin Industrial Commission ruled that deafness due to industrial noise is an occupational disease, rather than an accident. It held the employer (in this case, the employer's insurance company) liable for the claim. A 60 year old drop hammer operator who showed a 13.5% loss of hearing in both ears was the recipient of the award. Although the Commission acknowledged that some loss was due to his advanced age, they ruled most of the loss was due to exposure to "excessive noise in his occupation." It was not established when the actual loss of hearing took place. It is conceivable that he had a hearing impairment at the time employment was begun. New York Courts have also held that deafness is an occupational disease, and that a worker is entitled to damages even though he has lost no time from work or loss of wages. Payment of damages is made for a physiologic loss as distinguished from an economic one. The Wisconsin ruling, however, has gone several steps further than the New York decisions in granting an interlocutory award with some immediate damage payment. This has many far-reaching implications. The Wisconsin Industrial Commission chose this as a test case from among some 75 hearing loss claims pending at the time. This award will probably serve as a pattern in reaching settlements of others pending, as well as those filed in the future. Even though the worker has continued to work and has suffered no loss of earnings, it establishes that the loss must be compensated. Further, that compensation must be arrived at without regard for any correction which might be effected by hearing aids or any other appliances for auditory rehabilitation. Unlike the New York decisions, where none of the compensation was to be paid until after a period of two years, this award provides for payment of 75% of the amount at once, with the balance deferred. Such action might seriously hamper the operations of a concern threatened with multiple suits at one time. That the award in the case was interlocutory means that the employee, at any future time, may claim and be given further compensasation if re-examination shows he has incurred further hearing loss. Even though he has terminated employment with the company, he can make his claim. Finally, the statute of limitations is no defense whatsoever, unless the employer has pre-

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placement hearing tests to prove the employee had the hearing loss prior to employment. For full protection against future claims, industry should make audiometric hearing tests a part of every preemployment examination. It is also advisable for them to extend these tests to include persons already on their payroll. In the case of companies having periodic medical checkups, it should be made part of the regular examination.

—*Methods*, November, 1953.

For Federal Employees

A HEALTH program for Federal employees was established by action of the Seventy-Ninth Congress in 1946 (Public Law 658). The program got under way in 1948 and has recently been transferred to the Department of Health, Education and Welfare under the direction of DR. JOSEPH WEISSKOFF. Approximately 50,000 persons are covered by this program and its degree of utilization is high, 40,000 persons (not necessarily representing the original 50,000 covered, since the personnel is to some extent transient) having participated. The two major objectives of the program are to serve the Federal employee by helping him to retain optimal health while on the job, and to serve the employer (the government, including all taxpayers) by increasing or continuing production through the establishment and maintenance of methods and standards that make it possible for the employee to remain in optimal health in his total work environment. No attempt is made to give medical care. The system is patterned on that used in private industry. Emergency care is provided for those injured on the job. Employees needing medical or surgical attention are referred to private physicians and dentists. The various governmental agencies are authorized to establish this program and to allow the sum of $9 per person per year in their budgets to pay for it. When possible, public-health nurses and physicians are utilized. The employee's own physician is given all necessary information. In case of an occupational injury, Federal facilities for treatment are available, and full medical care is given. There has been little or no opposition by the profession to this plan when it has been completely understood. There is no effort to supplement or to interfere with private practice. Indeed, it is said that private practice is increased by the health program. At present in the Boston area only the general services such as the housekeeping services at the post office are included. A copy of the law and a statement of the policy of administration together with certain data concerning experience during the past five years are on file in the office of the Director of Medical Information and Education of the Massachusetts Medical Society.

—*New England J. Med.*, August 6, 1953.

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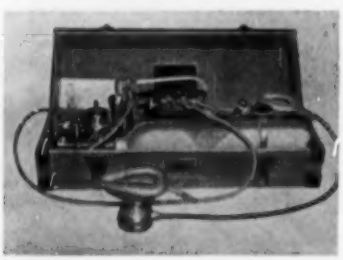

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tation, the Public Health Service, the Veterans Administration, state employment services, and voluntary agencies in the field of health and rehabilitation—while intended for use of staff members serving the handicapped in public employment offices, should be valuable to rehabilitation workers, vocational counselors, placement officers, industrial physicians, and others in helping physically handicapped persons to choose a suitable occupation and find employment in it. Each pamphlet describes a disease or disability, together with the major factors that have counseling and placement implications and, hence, must be considered in estimating the work capacities of individuals affected by it. Now available are guides on tuberculosis, heart disease, and epilepsy, together with a pamphlet entitled, "Suggestions for Using Interviewing Guides for Specific Disabilities." Others are in process. Pamphlets may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D.C., at five cents per copy.

AEC Fellowships

EIGHT Fellowships in industrial medicine will be offered by the U.S. Atomic Energy Commission for the 1954-1955 academic year. The Fellowship program, which was begun by the AEC four years ago, is designed to provide advanced training and on-the-job experience for physicians in the field of industrial medicine, particularly in relation to the atomic energy industry. The Fellowships are open to U.S. citizens who hold M.D. degrees from approved medical schools and who have had at least one year of internship. In exceptional cases, equivalent experience may be accepted in lieu of the internship requirement. Successful candidates must be investigated by the FBI and approved by the AEC before receiving Fellowships. Awards are for the year's academic training at institutions offering approved graduate courses in industrial medicine that provide special training facilities in the health problems associated with the atomic energy program. Normally, Fellows will be eligible for a second, or in-plant, training year on successful completion of the academic year. In-plant training will be given in medical departments of major AEC plants and labora-

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tories. There is a critical need for qualified industrial physicians in atomic energy installations, and at the end of the two-year training period Fellows may find employment in the program. There will be no commitment, however, on the part of the AEC to continue the applicant's training beyond the first year or to provide employment for him on the completion of training. Fellows will not be obligated to take the second year of training or to seek employment with the AEC or its contractors. The stipend during the first year is $3,600, with $350 additional for a wife and for each dependent child. Tuition and laboratory fees will be paid. The stipend for the second year is $6,000, with no additional amounts for a wife or children. The program is administered for the AEC by the Atomic Energy Project of the School of Medicine and Dentistry, University of Rochester, New York. Fellows are selected by a committee headed by DR. ROBERT A. KEHOE, Director, Institute of Industrial Health, University of Cincinnati, and Medical Director, Ethyl Corporation.

Into Assets

SURVEYS show that handicapped people have better attendance records, stay longer on the same job, and have better safety records than so-called normal or younger people. These attributes describe older people exactly, plus the fact that 90% of these older people when retested had increased mental powers and ability. This information was not known to John D. MacArthur, President of the Bankers Life and Casualty Company, Chicago, when seven years ago, a sweet faced, bright-eyed little lady of 73 sat at his desk and asked for a job. He said, yes, but the responsibility of operating a large insurance company did not permit charity when it

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concerned its policyholders. It had to be understood that every employee had to do his or her job. Mrs. Verna Stewart got the job. "I think it was my experience in employing Mrs. Stewart," Mr. MacArthur said recently, "that widened my concept of the social responsibilities of the large corporation. Until I encountered her, it seemed to me that our company was the epitome of social consciousness. However, my meeting with her convinced me that there were facets I had ignored." Convinced that many older people and those physically handicapped could do certain jobs as well as those who were younger or more active physically, the Bankers Life and Casualty President passed the word down the line to department heads to give those handicapped people a chance. However, he also made it crystal clear the applicants were not to be employed as handicapped people, but as workers who could and would fill the jobs to which they were assigned. They were to get the same salaries as other employees; do as much work, and be treated exactly the same. The result? Bankers Life and Casualty now has 3,000 employees in its head office in Chicago, and no less than 780 of them—an astonishing 26%—are either more than 60 years old or physically handicapped. A man with a paralyzed left arm runs the photostat machine—and runs it efficiently. Fifteen deaf mute girls are file clerks—good file clerks, too, or they wouldn't last long in that busy office. There are women of 75 and men of 77. If other large corporations decide to give more thought to the possibility of employing more older citizens and those with physical handicaps—and he certainly hopes they will—Mr. MacArthur has a word of caution for them. "It's one thing," he points out, "to decide to hire such workers; it's another to put the decision into operation. There are many problems, and those problems must be thought out in advance if the plan is to work successfully." It isn't a simple matter to decide how best to use the skills of people past 60 or those with a physical handicap. A lot of thought and study is required to fit the capabilities of an aged or physically handicapped worker into a business office in such a way that the worker will be able to maintain his complete self-respect and the firm paying his salary will be able to realize a reasonable profit on its investment in him. Without having any hard-and-fast rules on the subject, the company's executives study each job applicant's strong and weak points, solely with the objective of choosing the type of work for him where his handicap may be actually transformed into an asset.

—From "Our Hidden Labor Asset," in *Health*, November-December, 1953.

Unholy Itch

THE practice of industrial dermatology is a fascinating specialty. It is full of surprises and of unusual cases. For example, the case of the minister who developed an unholy itch on his

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palms. This divine frequently surveyed the worldly throngs below his study window in the heart of the city. During these pensive moods he rested his palms on the painted windowsill, and derived more than inspiration from this effort. A cashier across the street in one of the uptown theatres had an itchy palm and wrist from contact with the metal counter of her ticket vending machine. One recalls the case of the switchboard operator with the cauliflower ear, sprouting from contact with her rubber headset. The seasons and weather are accessories to the crime of industrial dermatitis. One humid day a doper of gasoline spilled blue powder used to color the gasoline. His face blew up next day to pumpkin-sized proportions and he spent two weeks in a hospital regretting his carelessness. He had many times previously performed the same operation without mishap. There are many cases among florists where the tame cultivated plants, such as geranium, chrysanthemum, primula, and many others, excel the wild cousins of the ivy family in producing skin blooms, not pictured in the seed catalogues. Many a telephone lineman has rued the day he did not study botany, for the luckless, three-pronged, lion-toothed triple-leaf spray of the ivy, does not carry with it the luck of the clover. The much maligned housewife, considered by her husband as a lady of leisure, is really an industrial worker of the first order. In the daily round of her household chores she handles many more hazardous Irritants than does the average worker. The new detergent cleansers are strong enough to remove not only the grease from the dishes, the dirt from the clothes, and the rim off the bathtub, but in some instances the hide off an elephant.

—From "Industry's Damaged Skins," by LEMUEL P. EREAUX, M.D., in *Health*, November-December, 1953.

The Power of Believing

PEOPLE are individuals, with different ways of attaining their objectives. They interpret success differently. Thus, there is no common way to achieve the goal, no pat and perfected formula. But there is one common quality which all successful men—whether in business or any other field of endeavor—seem to possess. It is the ability to believe unflinchingly in the work they are doing. And because they believe in their work, their lives are sharply focused upon it—even to the extent of dimming all other things. The executive who develops an earnestness about his work—without becoming pompous or over-zealous—who believes that his work is worth-while and significant, is usually the one who accomplishes the most, and thus achieves the most success. By believing in what you are doing, you find that you possess a fathomless reservoir of strength for carrying out your work. Belief in your job will not produce miracles; it is not even guaranteed to produce results in all cases. And believing in what you are doing is not necessarily simple or easy; in fact, it may be the most difficult thing in the

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world for you, especially if yours is not a so-called "big job" with a lot of prestige, or if it is not particularly interesting. But if you can develop this belief in your work, it will probably self-perpetuate itself, and you will find that you are working with increasing enthusiasm. For all of us, the chances of success are different. Some have better odds than others. Regardless of what the odds are in your case, a strenuous, dynamic belief in the task you have taken on as your life work will greatly enhance your chances of success—maybe by 50% or more.

—Editorial, in *Office Executive*, November, 1953.

The Rubber Companies

ALMOST identical hospitalization, medical and surgical benefits are called for under the Firestone Tire and Rubber Company, Goodrich Tire and Rubber Company and Goodyear Tire and Rubber Company contracts with Rubber Workers-CIO. The companies will pay the full cost of providing the following benefits: The contract calls for 120 days of hospitalization in a semi-private room plus all miscellaneous hospital expenses, including cardiographs, x-ray, oxygen, and anesthesia. An in-hospital medical benefit of $3 per call up to 120 days is included, as well as a $250 surgical schedule. A $70 allowance is made for out-patient x-ray diagnosis for employees only. Immediate maternity coverage is to be provided for both dependent wives and employees. In event of layoffs, coverage is continued to the end of the next calendar month following the layoff. On authorized leaves of absence coverage is continued for 90 days. Coverage is also continued for employees while on union duty. In event the employee is disabled and is receiving workmen's compensation, hospitalization coverage is continued for dependents. Pensioners may purchase hospitalization insurance. Dependents are covered from birth, and children over 19 are covered if they are dependent on the employee. The Firestone and Goodrich settlements are especially significant in regard to provisions for temporary disability benefits. The cost of temporary disability, if elected by a local, will be applied against a five-cents an hour wage increase. In other words, the company will pay the cost of the benefit and the balance of the five cents per hour will be paid as cash wages. The benefit is $35 a week for males up to 26 weeks, and $27 a week for females at Firestone and $25 a week for females at Goodrich. Benefits start on the first day in case of accident and the eighth day in case of sickness. The same layoff, leave of absence and union duty provisions called for under the hospitalization plan apply . . . . A special provision under the Goodrich plan specifies that the company will pay the cost of providing $10 a day hospitalization benefits for workers who have retired since April 1, 1950, under the pension plan. This is subject to a maximum of $310 in any one year.

—*Employee Benefit Plan Review*, October, 1953.

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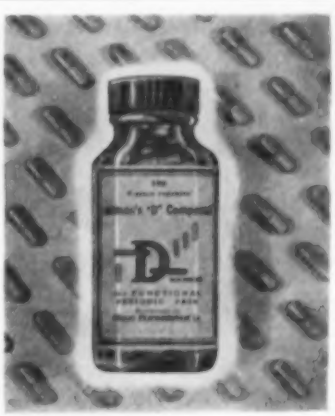

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REFERENCES:
1. Gastric Tolerance for Aspirin and Buffered Aspirin. Ind. Med. 20:480, Oct. 1951.
2. Effect of Buffering Agents on Absorption of Acetylsalicylic Acid. J. Am. Pharm. Assoc., Sc. Ed. 39:21, Jan. 1950.

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